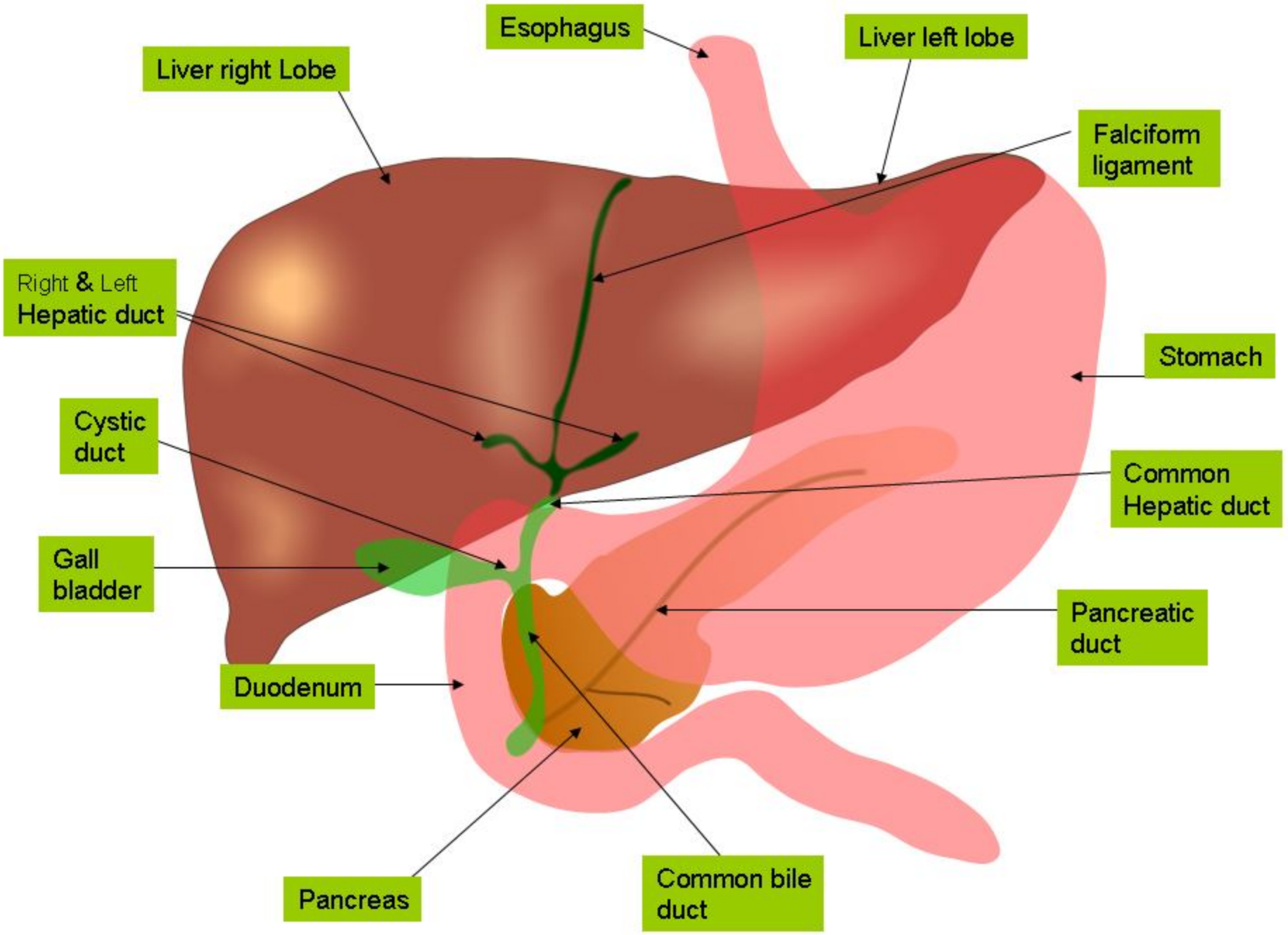
肝、胆、胰、脾
Liver, bile duct, pancreas and spleen

陈少琼（Chen,Shaoqiong)


Esophagus
Liver left lobe
Liver right Lobe
Falciform ligament
Right & Left Hepatic duct
Stomach
Cystic duct
Common Hepatic duct
Gall bladder
Pancreatic duct
Duodenum
Pancreas
Common bile duct

Technique and methods

1. Liver angiography
2. CT
3. MRI
4. Contrast examination of the bile duct：

Oral cholecystography

Intravenous cholecystocholangiography

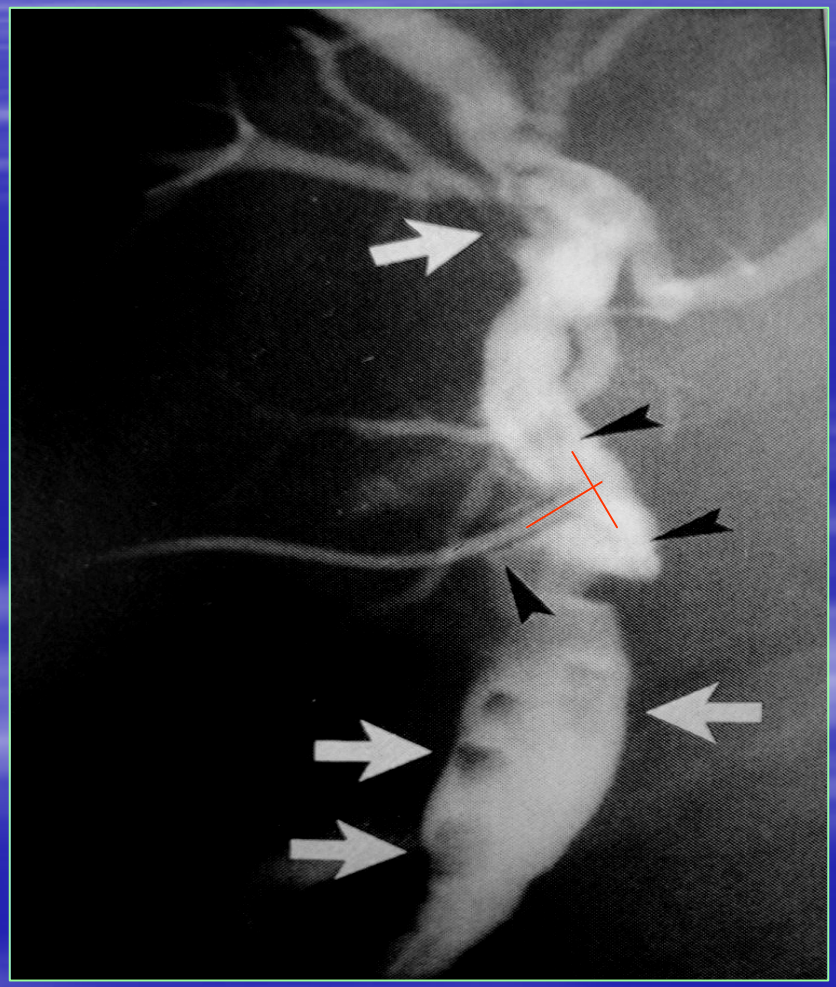
Direct cholangiography

T-tube Cholangiography

PTC --------Percutancous transhepatic cholangiography

ERCP ------Endoscopic retrograde cholangiopancreatography

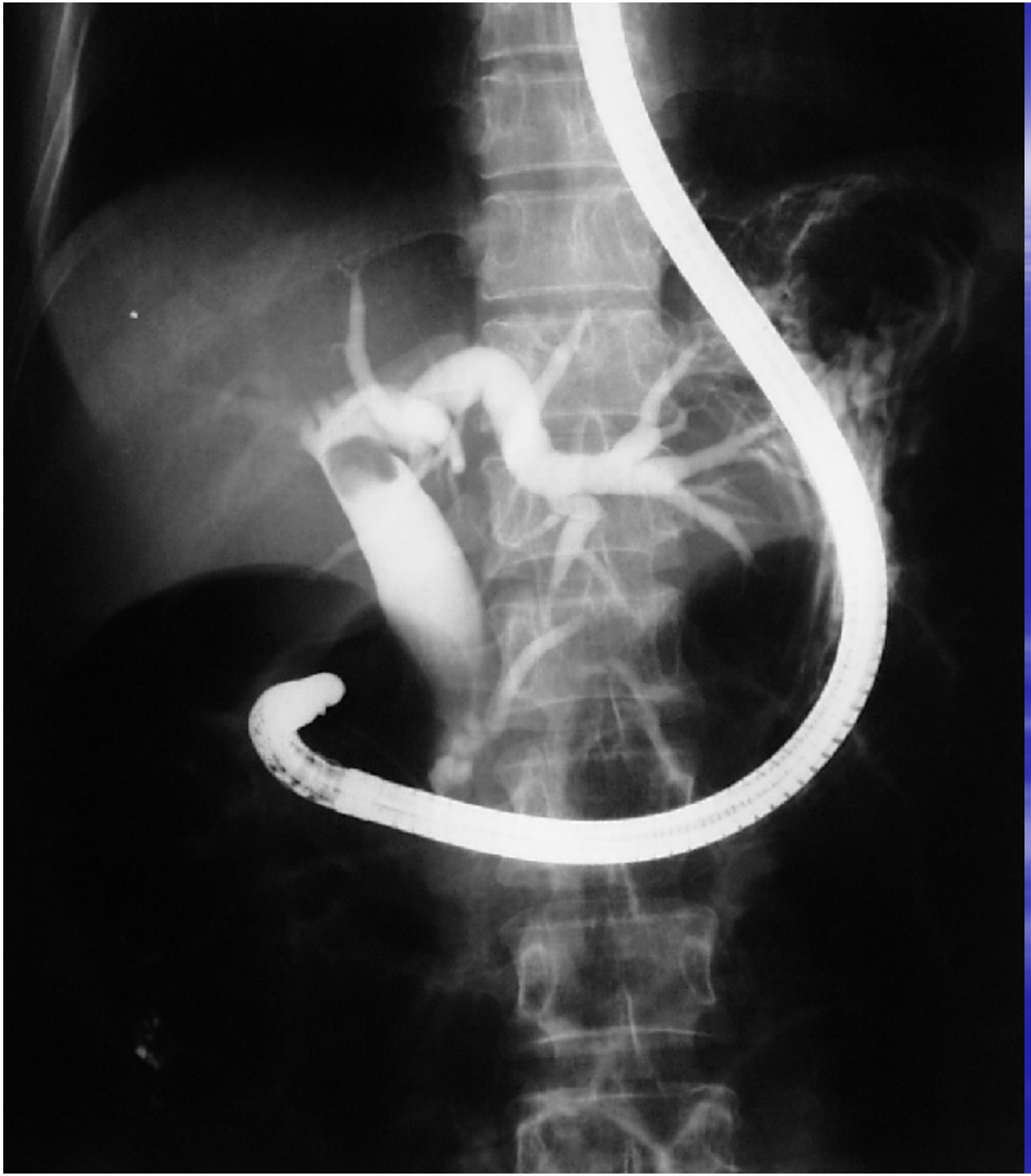
Technique and methods



T-tube
Cholangiography

Technique and methods

PTC造影



ERCP

显示胆总管、肝总管及肝内胆管及胰管情况

CT

1. CT plain scan：

（1）Slice thick：10MM，5MM

（2）Region: cover the whole organ

2. Enhancement scanning**:**

（1）Purpose： resolution，diagnosis. vessels

（2）Methods：Arterial phase（20-25”），portal phase（60”），delayed phase（5-7’）

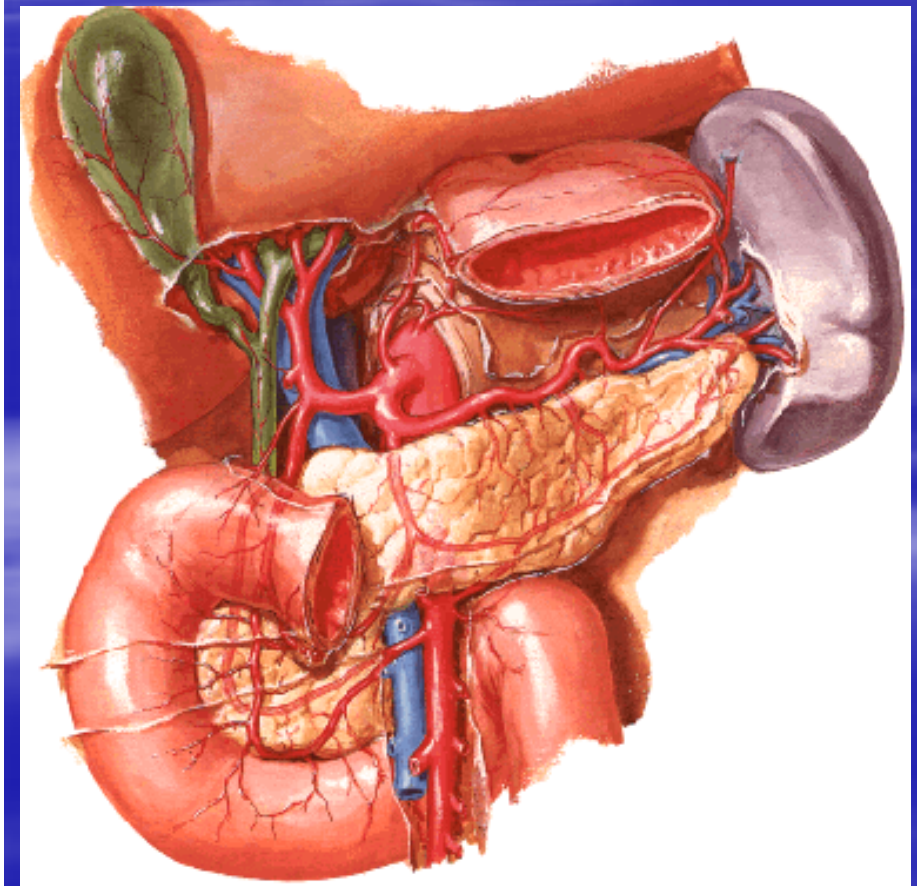
Imaging of the hepatic vessels
Artery
Portal vein
Hepatic vein
22 6:10

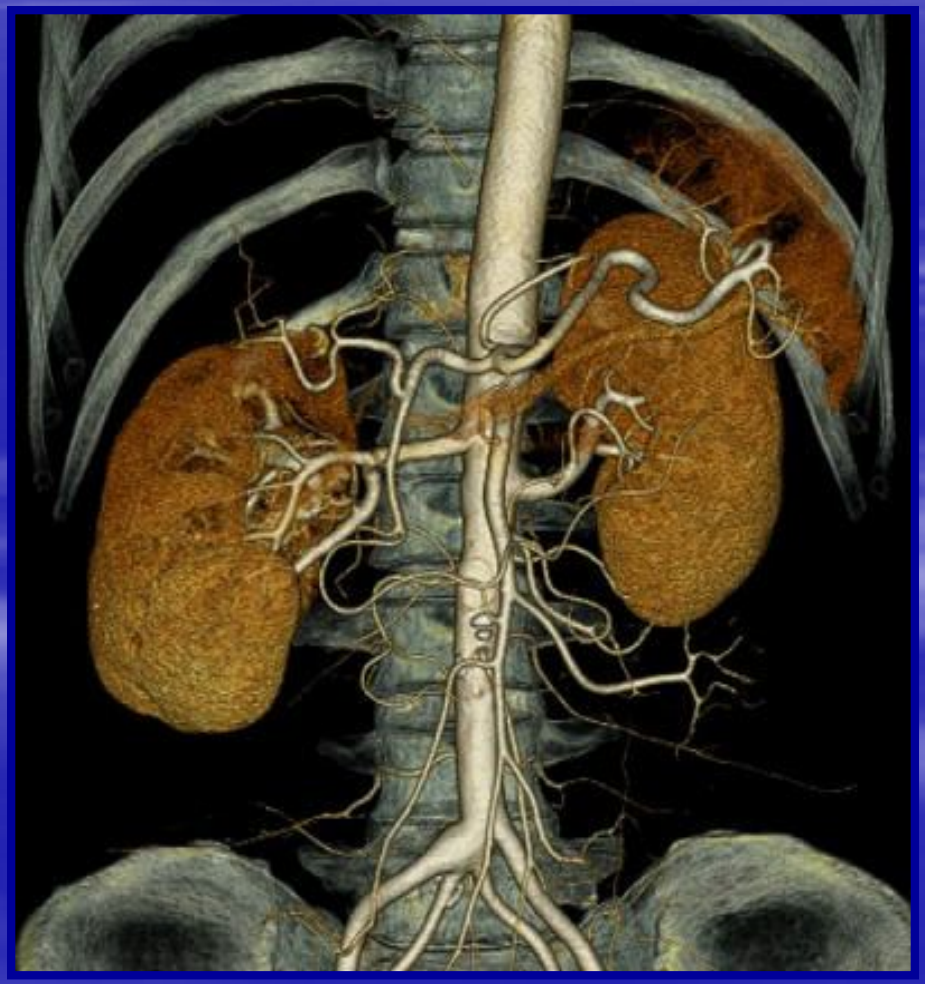
Hepatic vessels

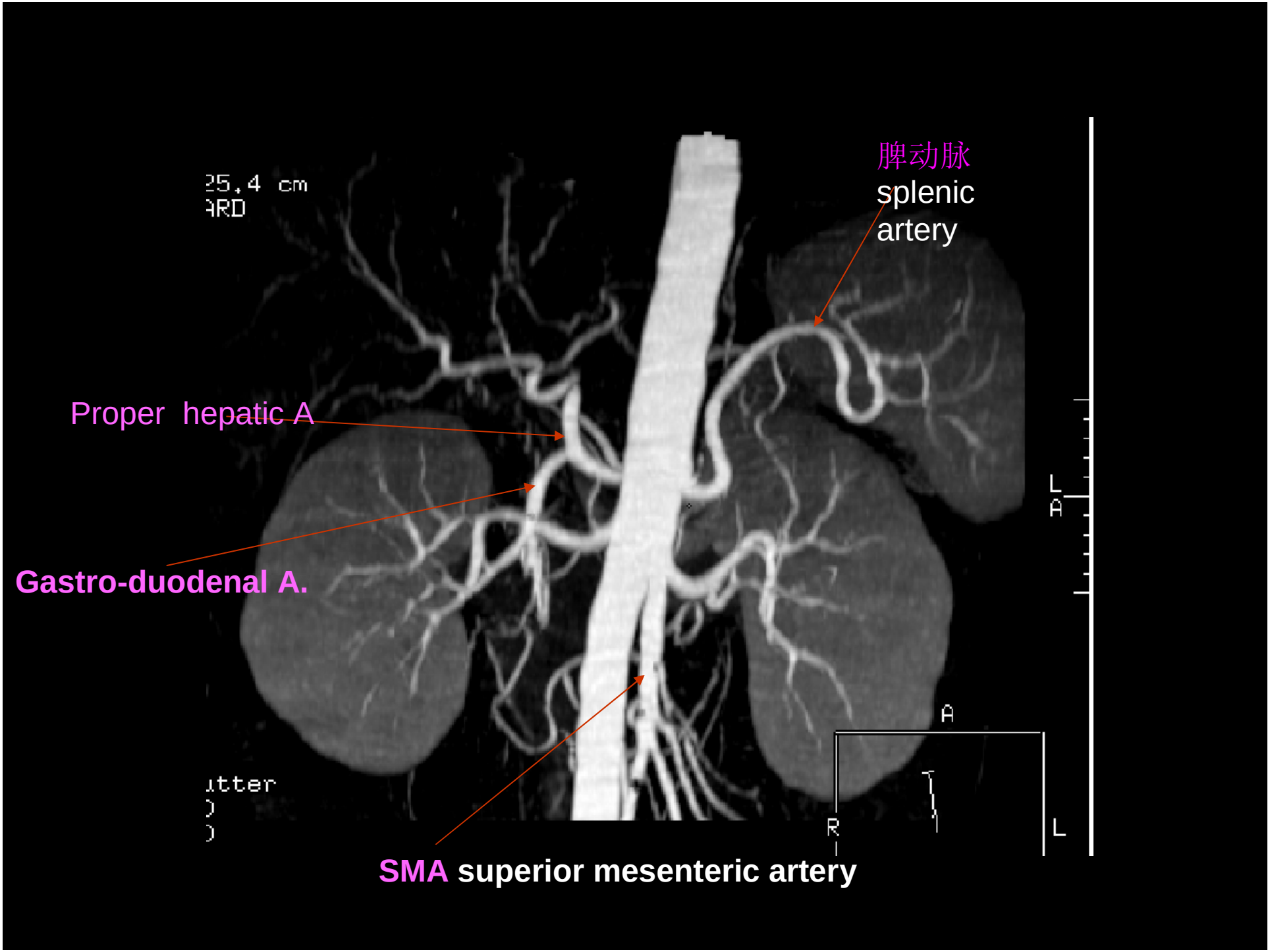
- Hepatic artery： Celiac trunk— common hepatic A.— Proper hepatic A — Lt. and Rt. hepatic A.

- Portal vein： left branch、right branch
- Hepatic vein： left、intermediate、right

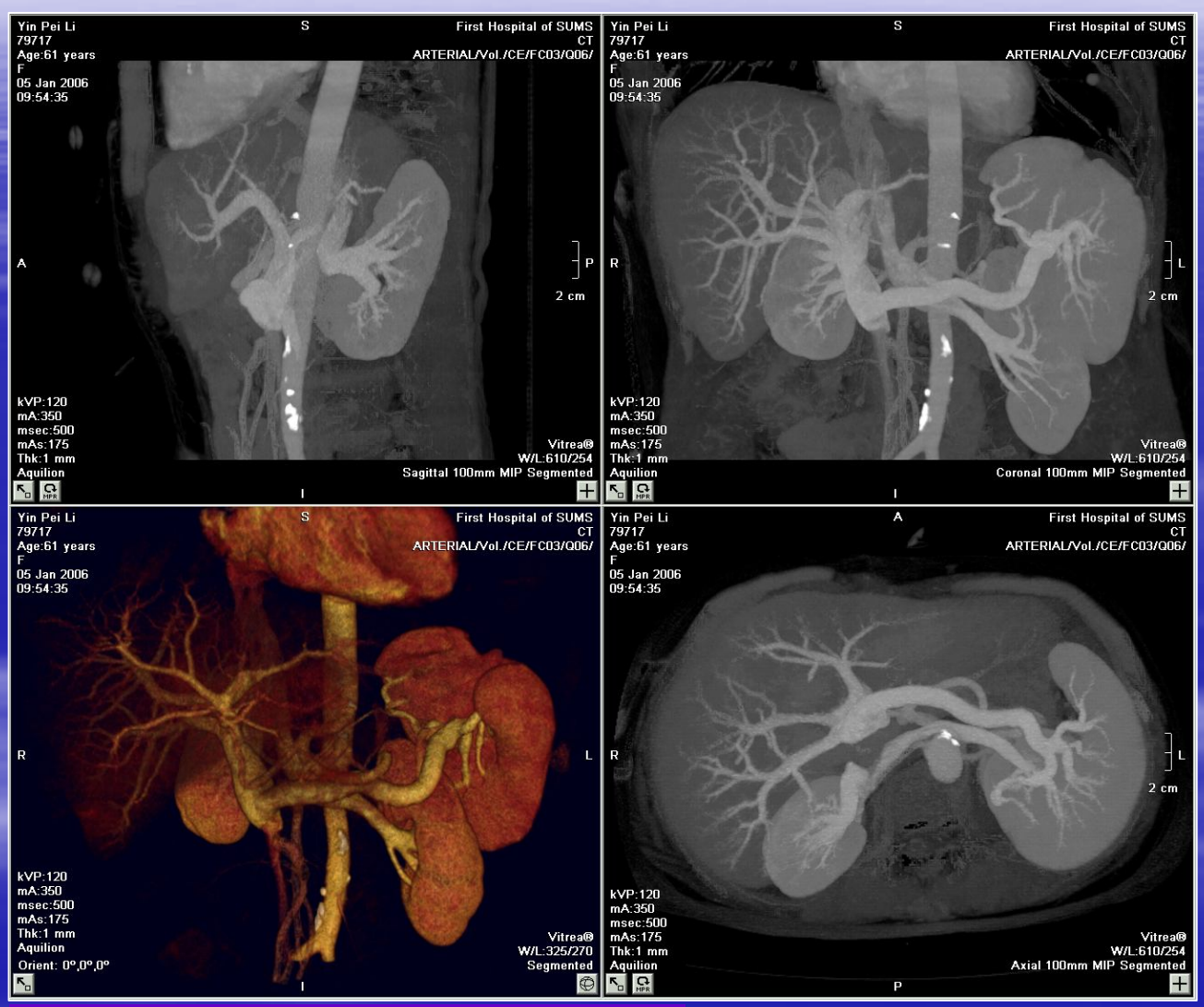
Normal anatomy






脾动脉
splenic
artery
Proper hepatic A
Gastro-duodenal A.
SMA superior mesenteric artery

A
R



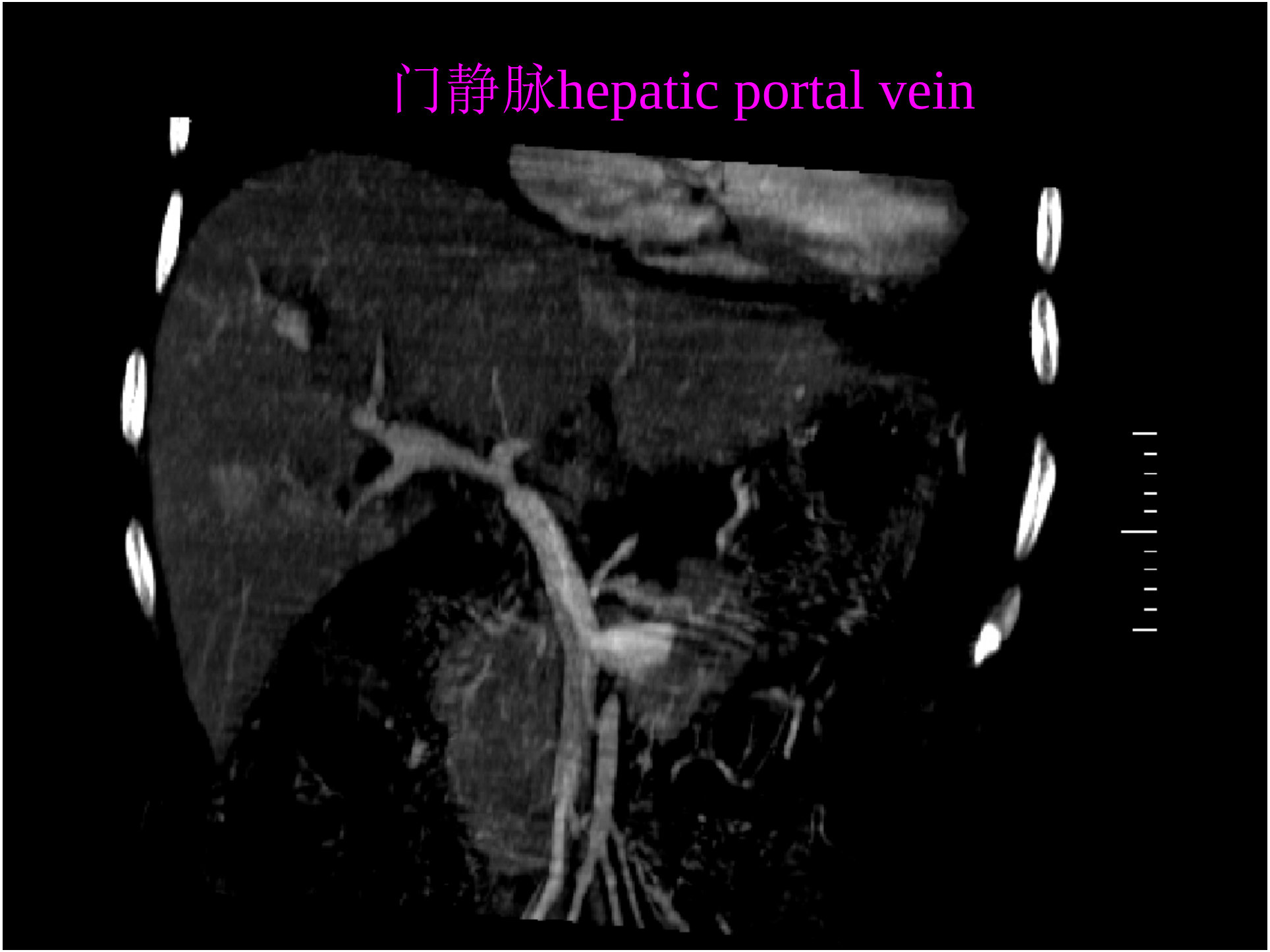
门脉主干及其分支清晰显示。

门静脉CE MRA

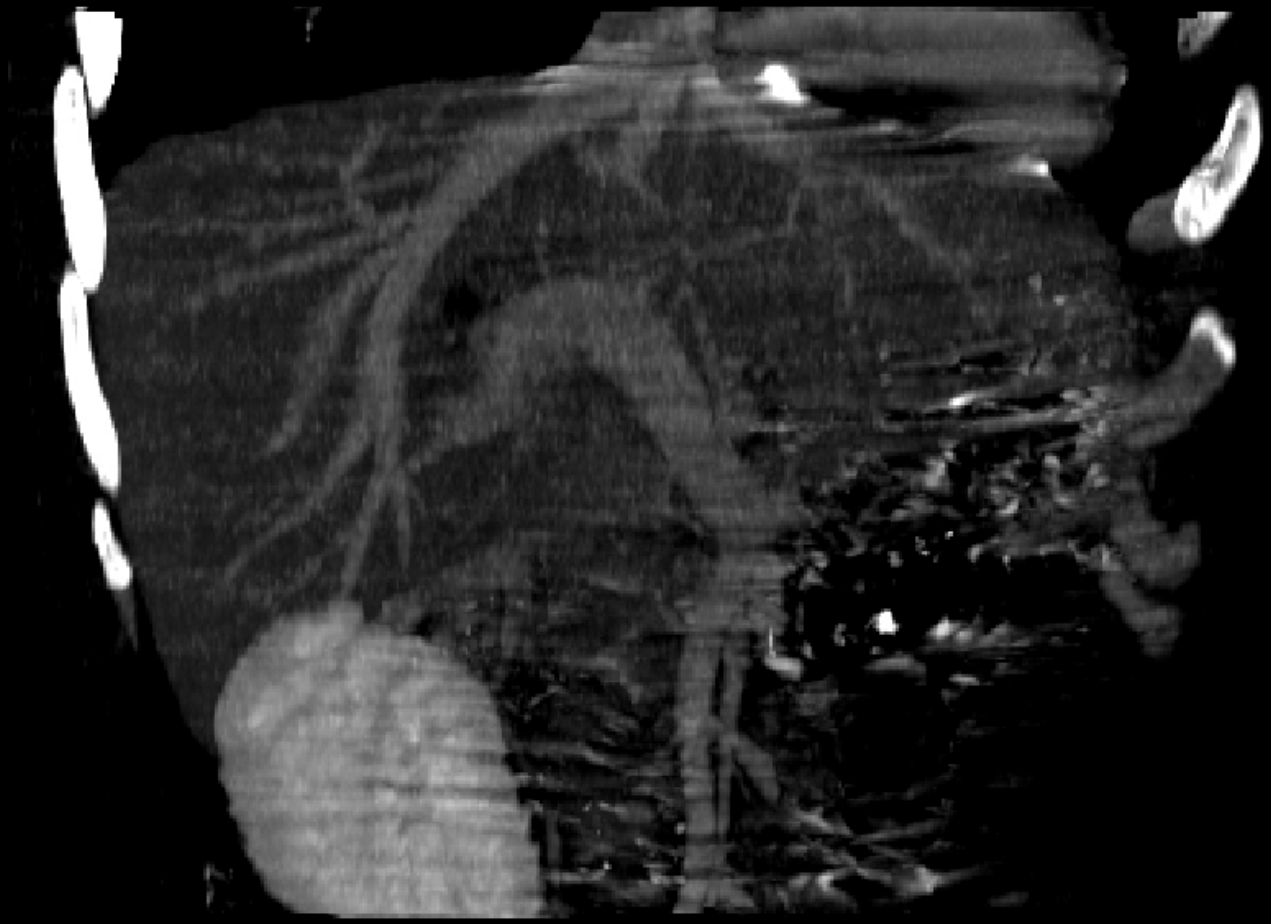
3ml/s

20mlGd-DTPA

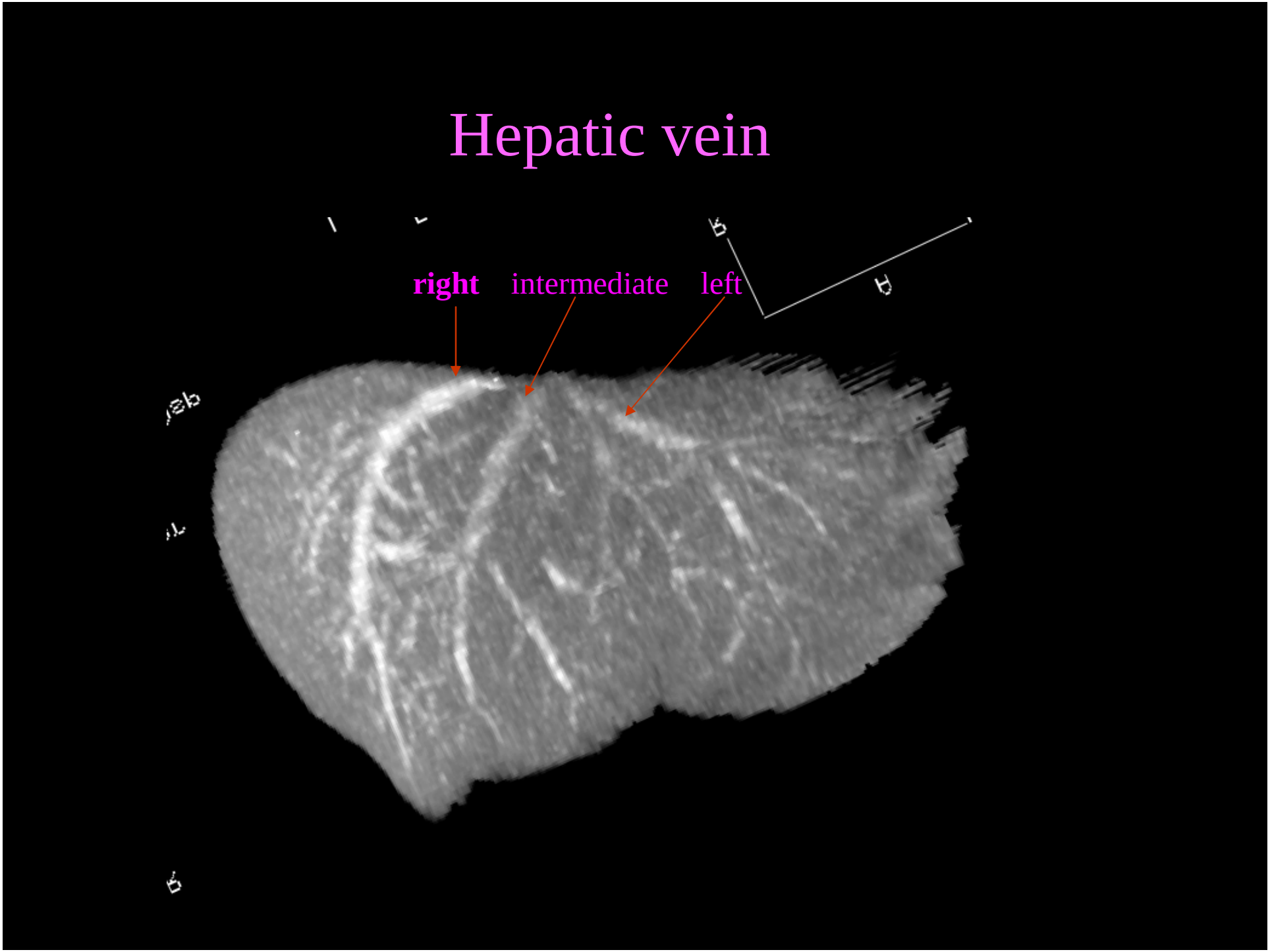
门静脉hepatic portal vein

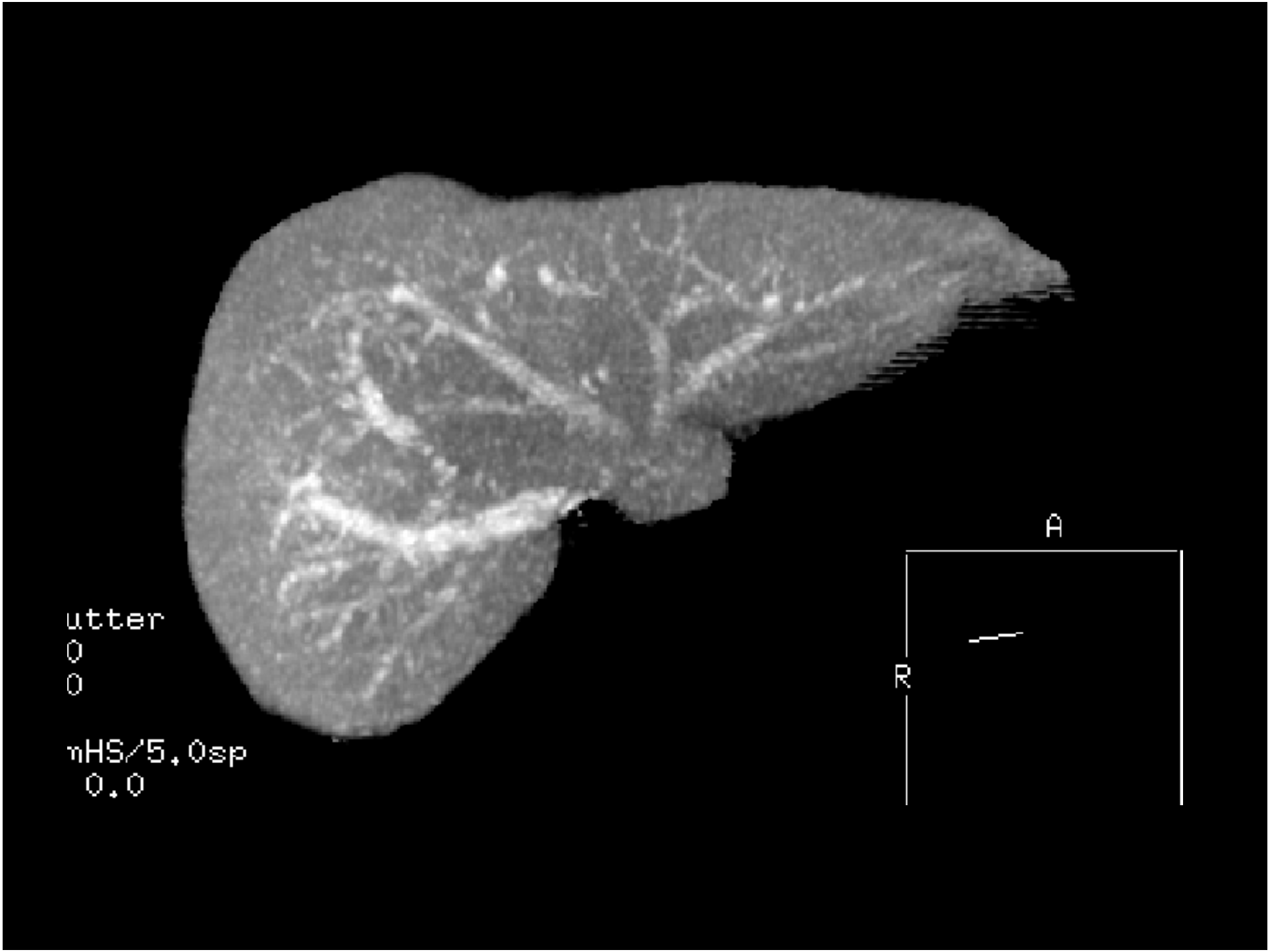


Portal vein and hepatic vein

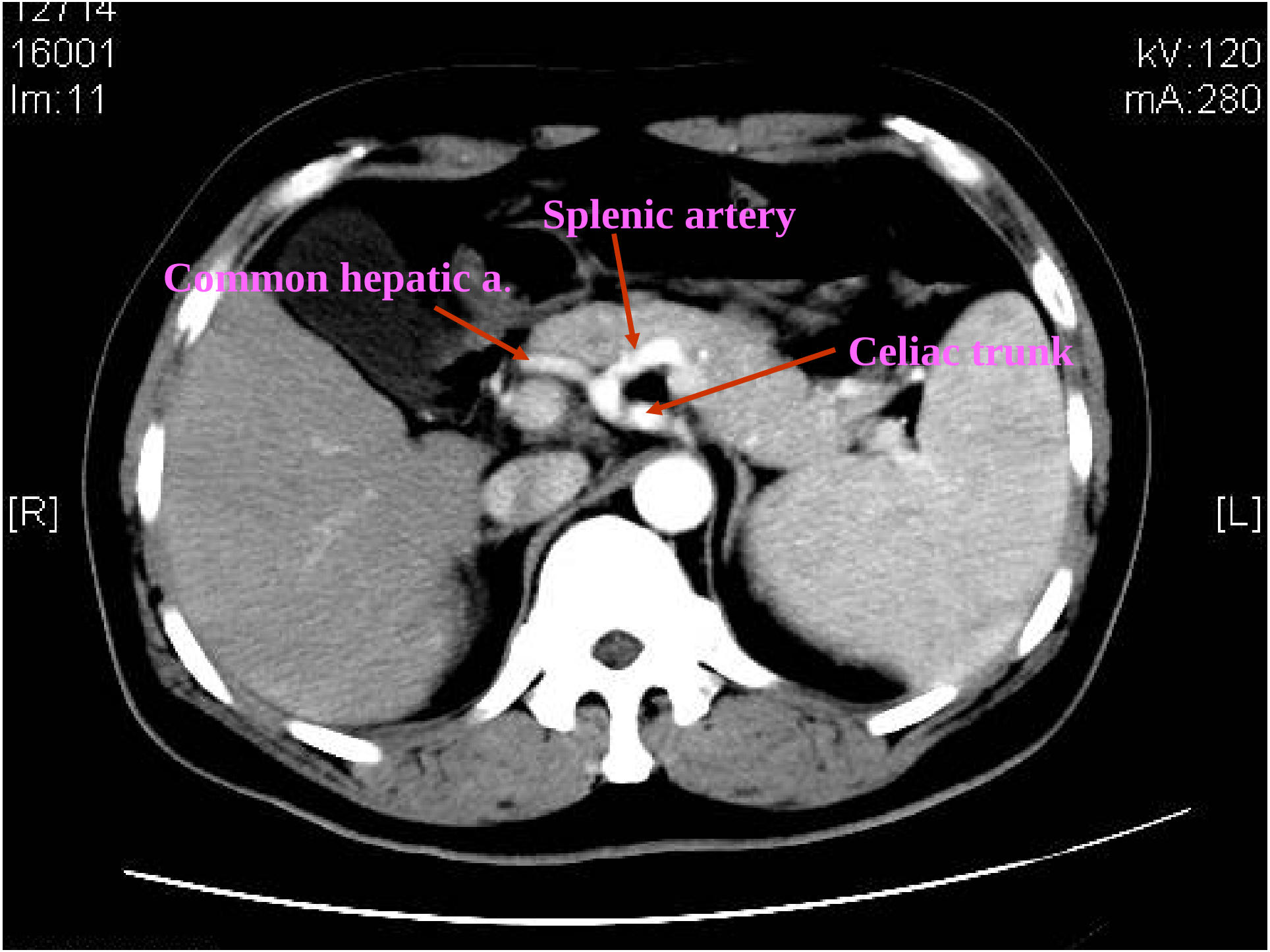


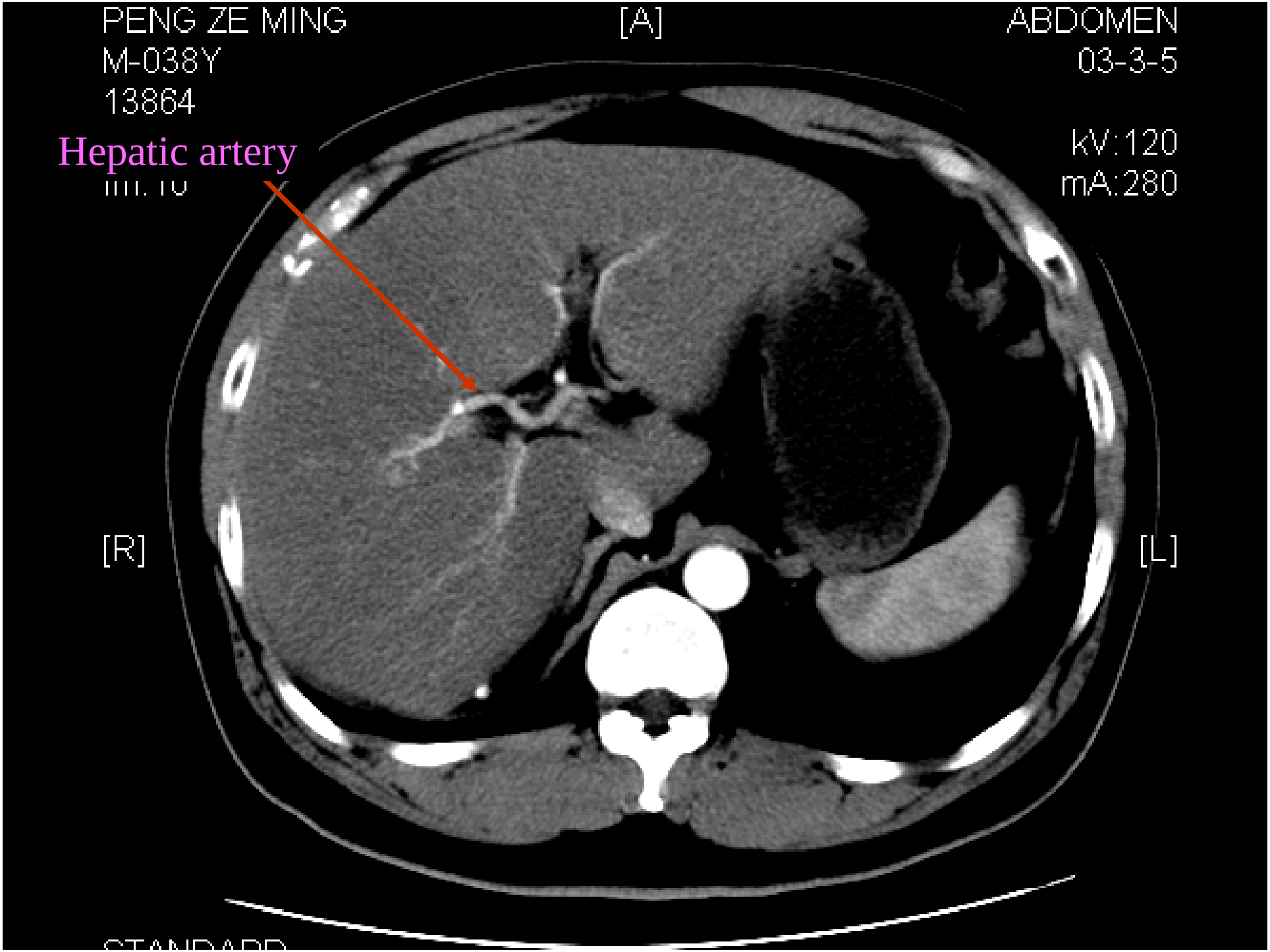
Hepatic vein

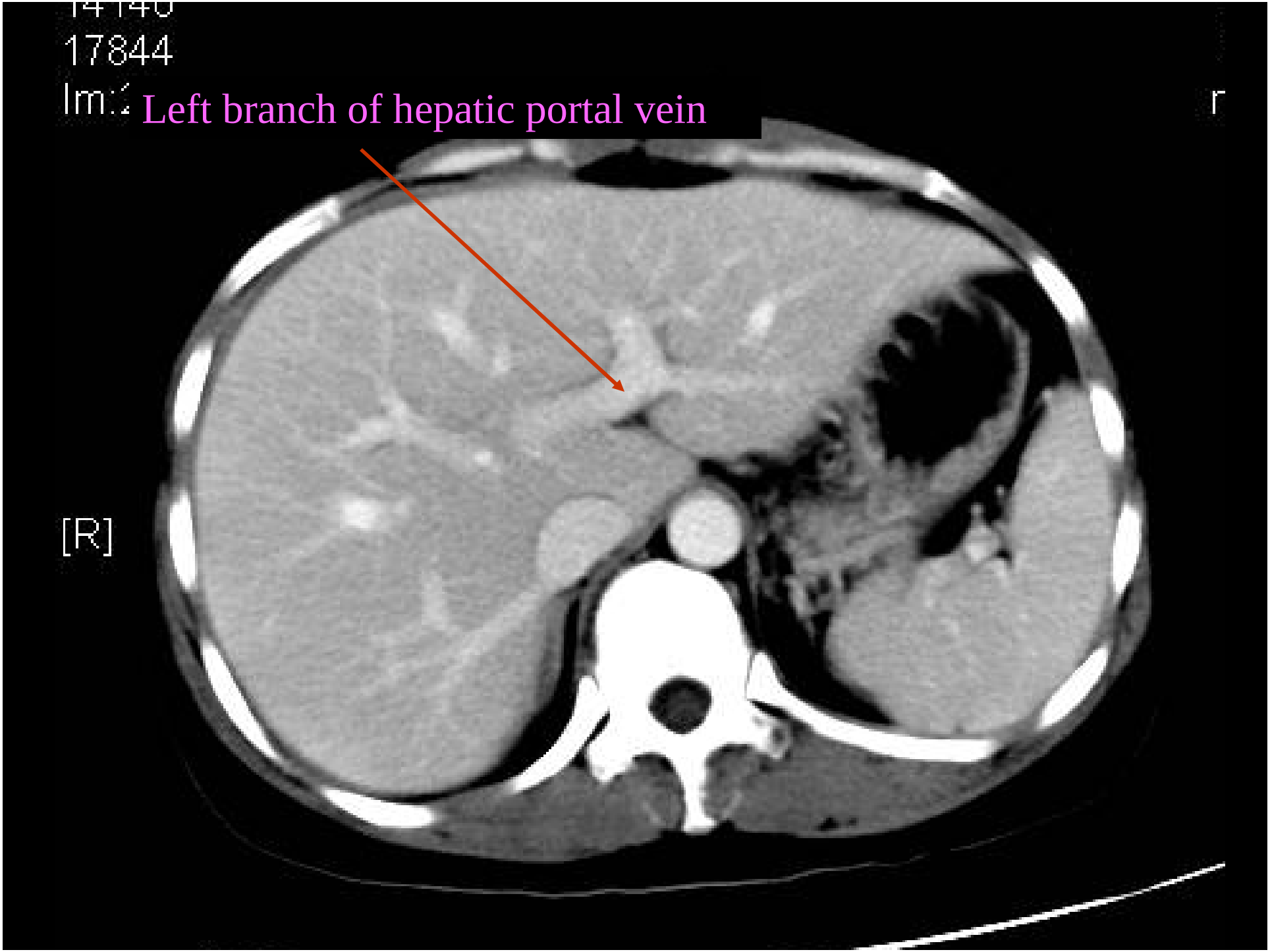


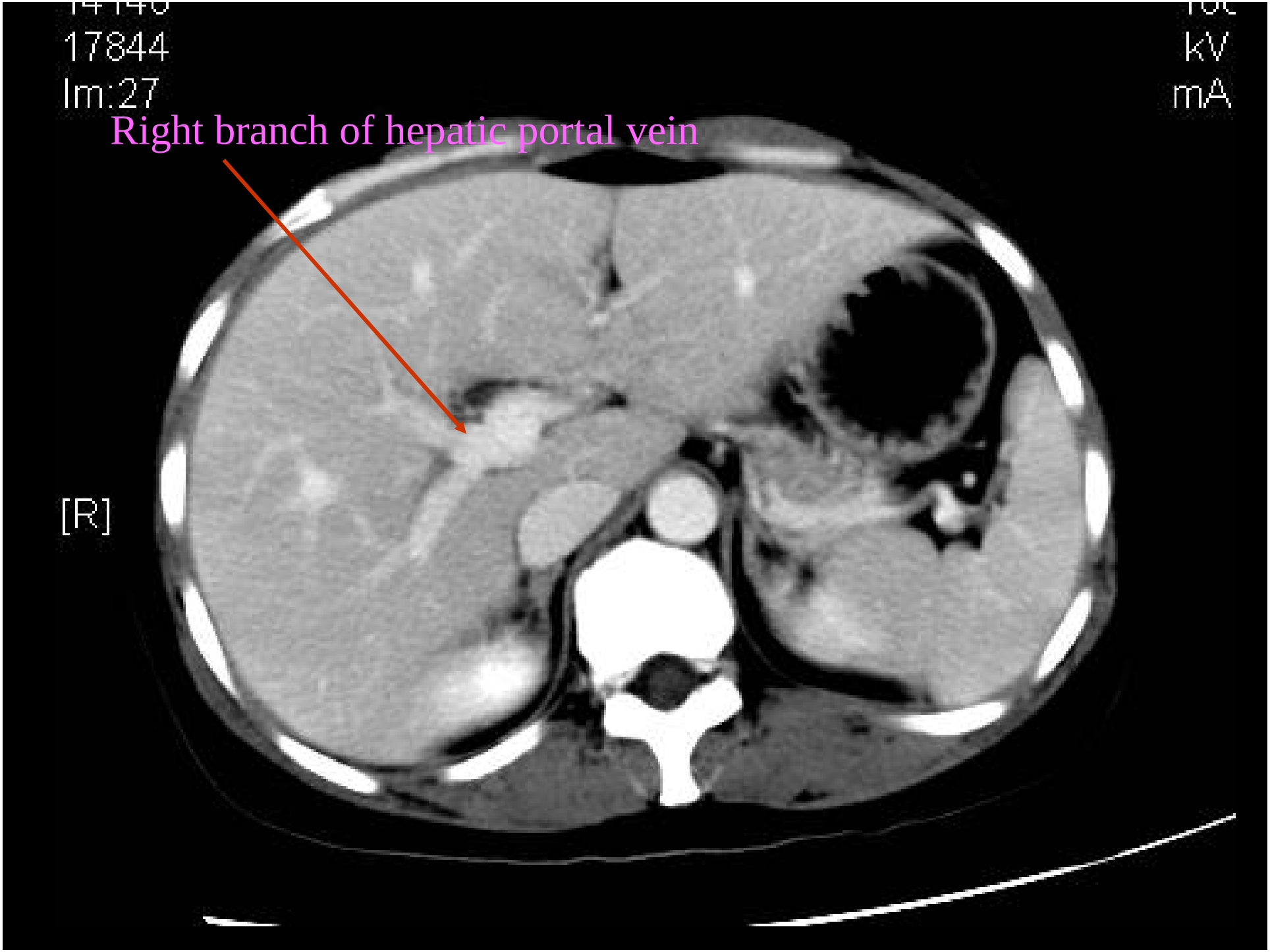

utter
0
0
mHS/5.0sp
0.0
A
R

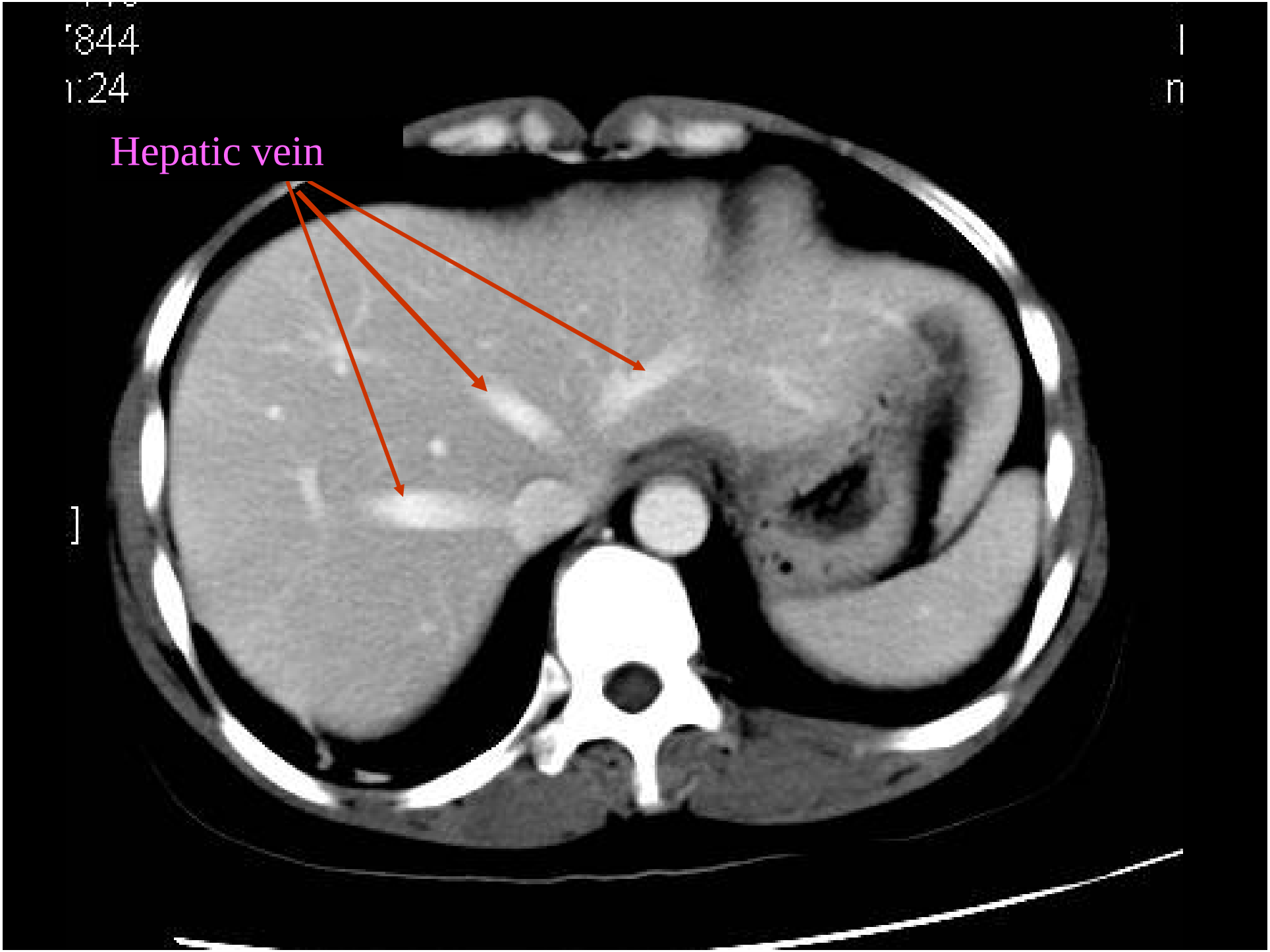
肝右v


12714
16001
Im:11
kV:120
mA:280
Splenic artery
Common hepatic a.
Celiac trunk
[R]
[L]


PENG ZE MING
M-038Y
13864
[A]
ABDOMEN
03-3-5
kV:120
mA:280
Hepatic artery
[R]
[L]


17844
Left branch of hepatic portal vein
[R]

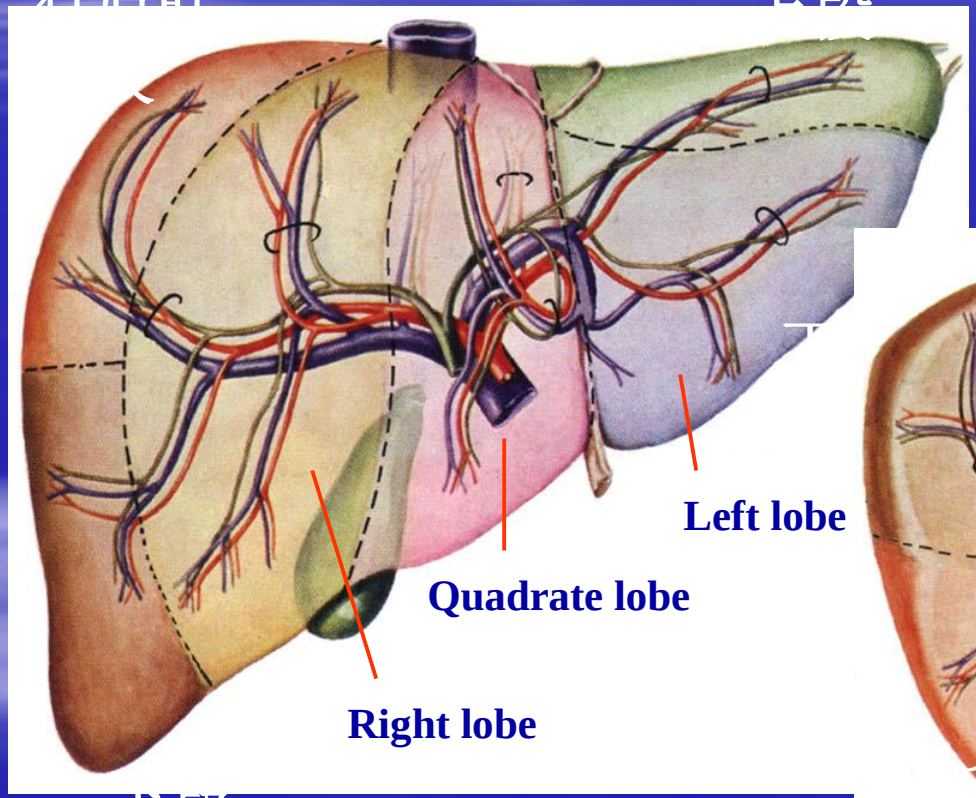

17844
Im:27
kV
mA
Right branch of hepatic portal vein
[R]

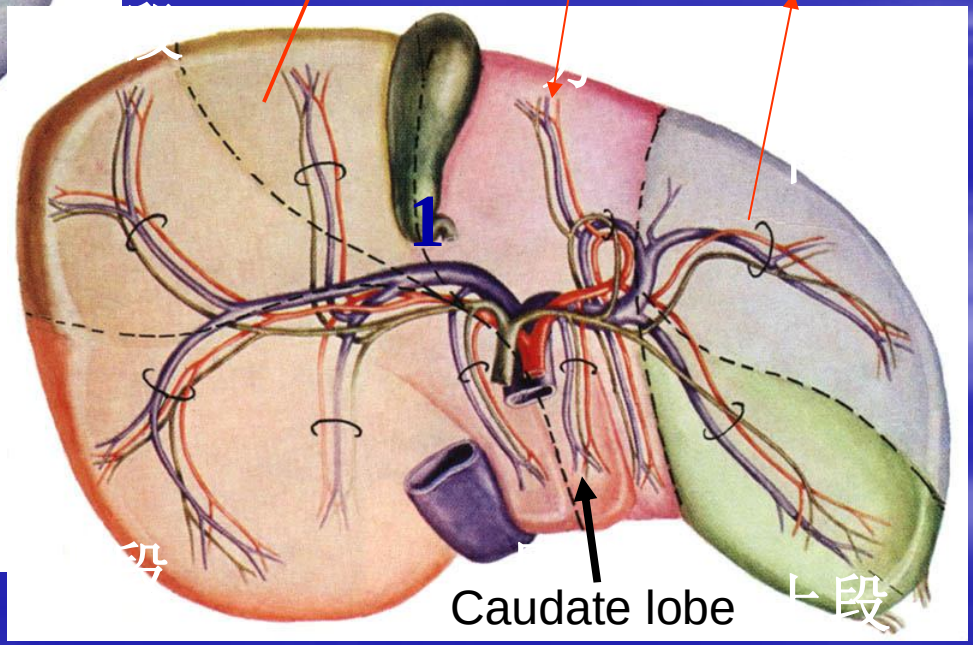

Hepatic vein

Liver lobes

Lobes： Caudate lobe (S1)， Left lobe （S2、3)、Quadrate lobe（S4）， Right lobe（S5、6、7、8）

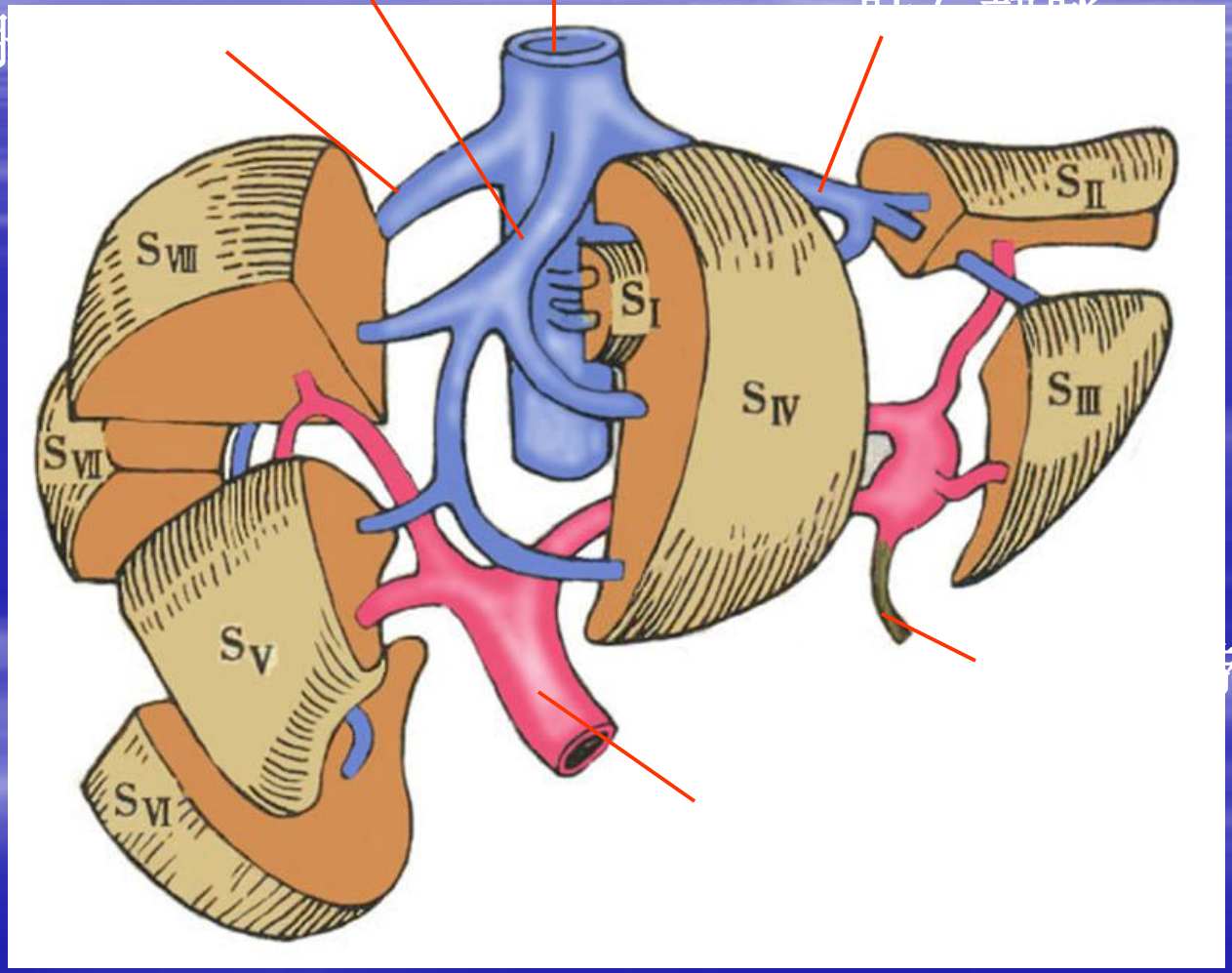
Liver lobes



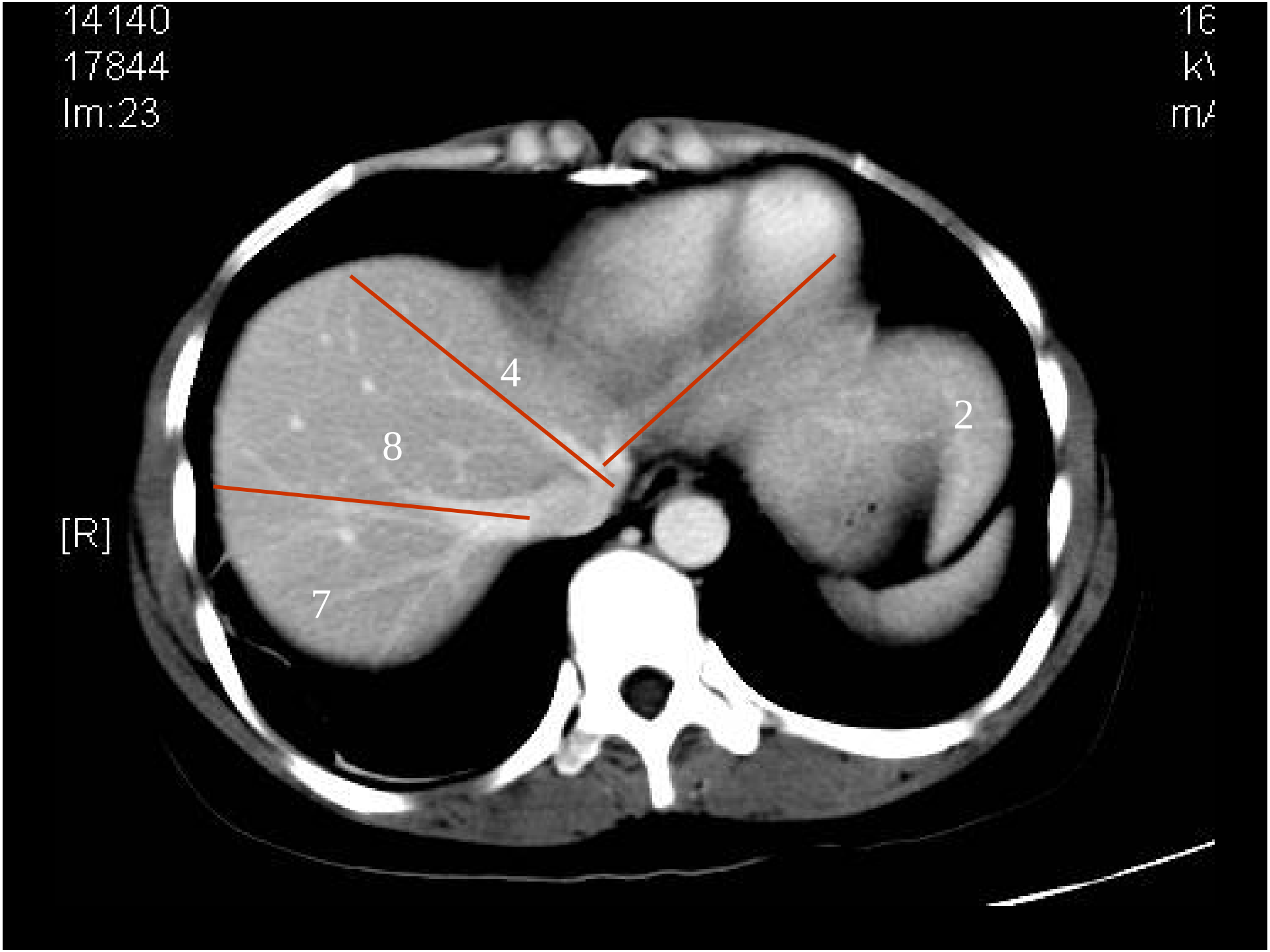


右后叶 左内叶 左外叶

(二) Couinaud 肝段划分法 (8 段划分法)



CT


14140
17844
Im:23
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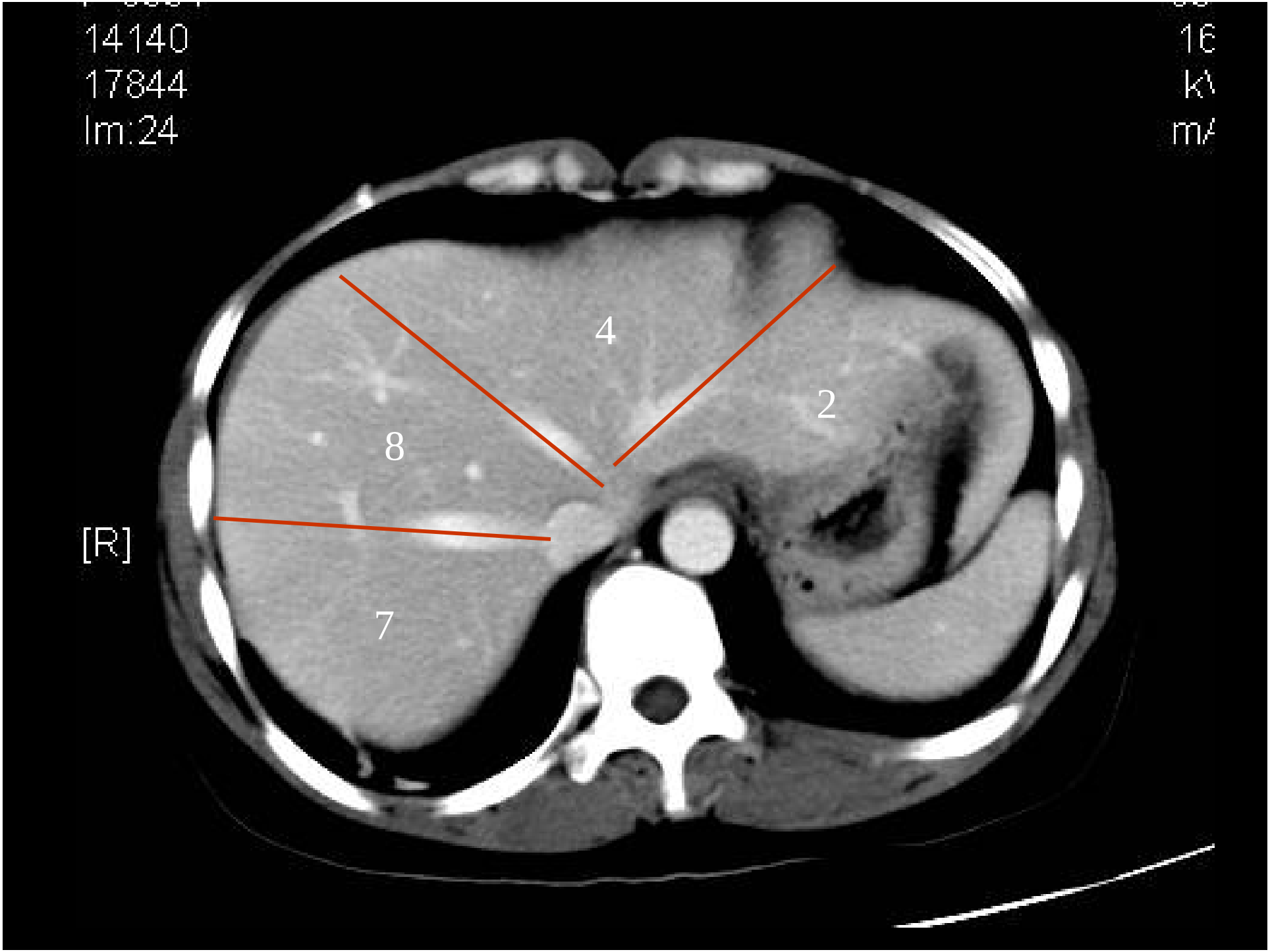
4
2
8
7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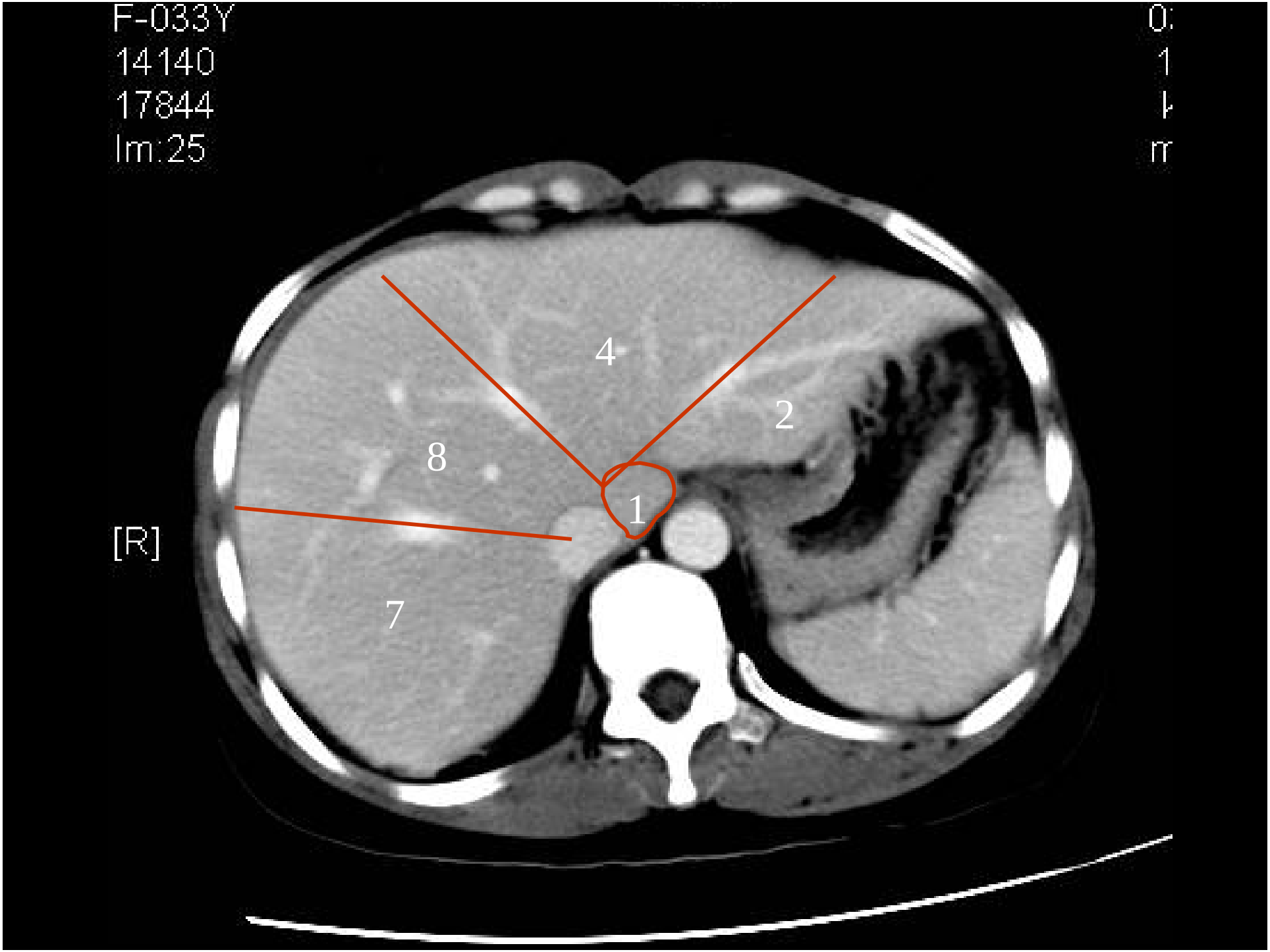
F-033Y
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17844
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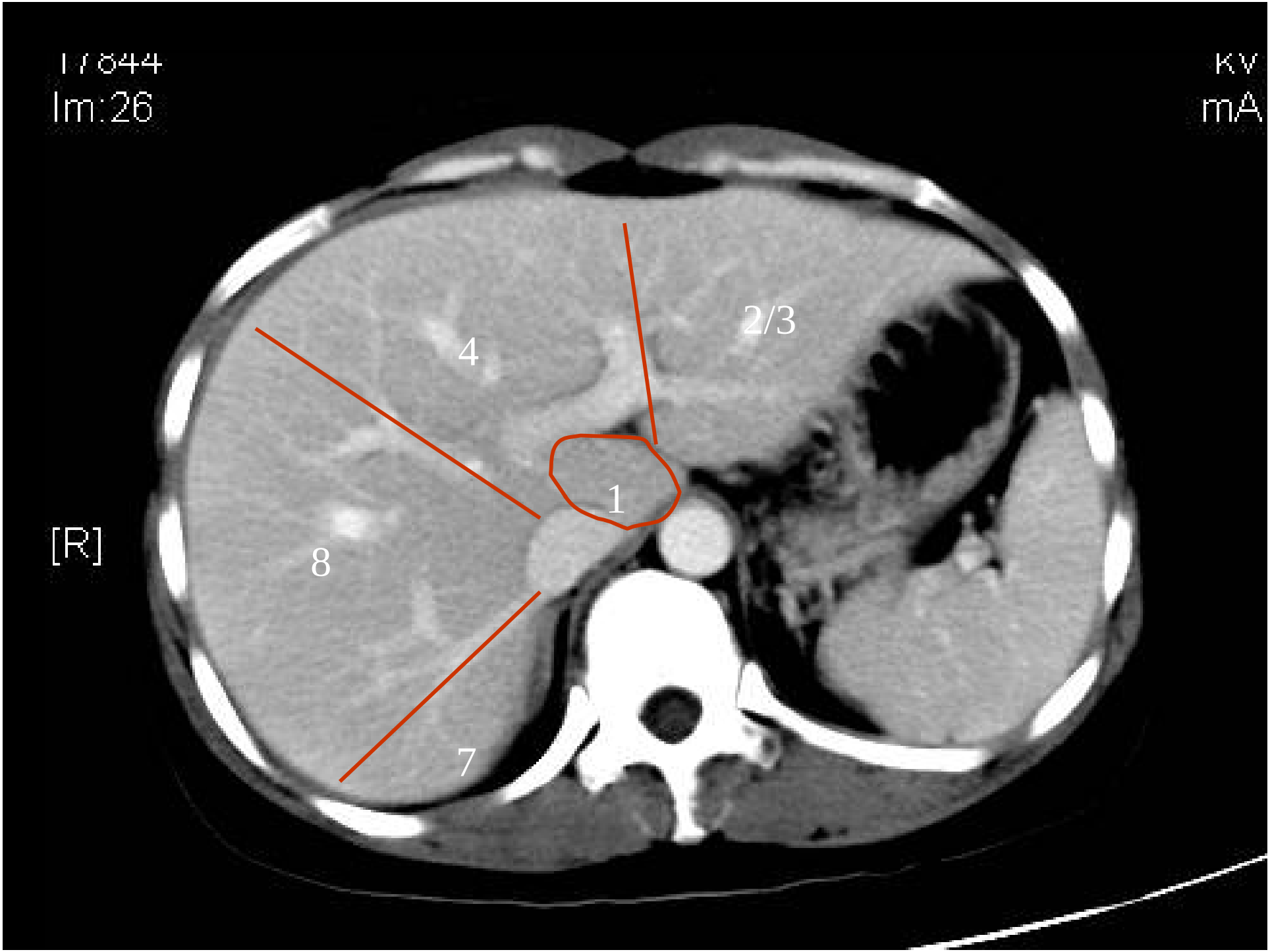
4
2
8
1
7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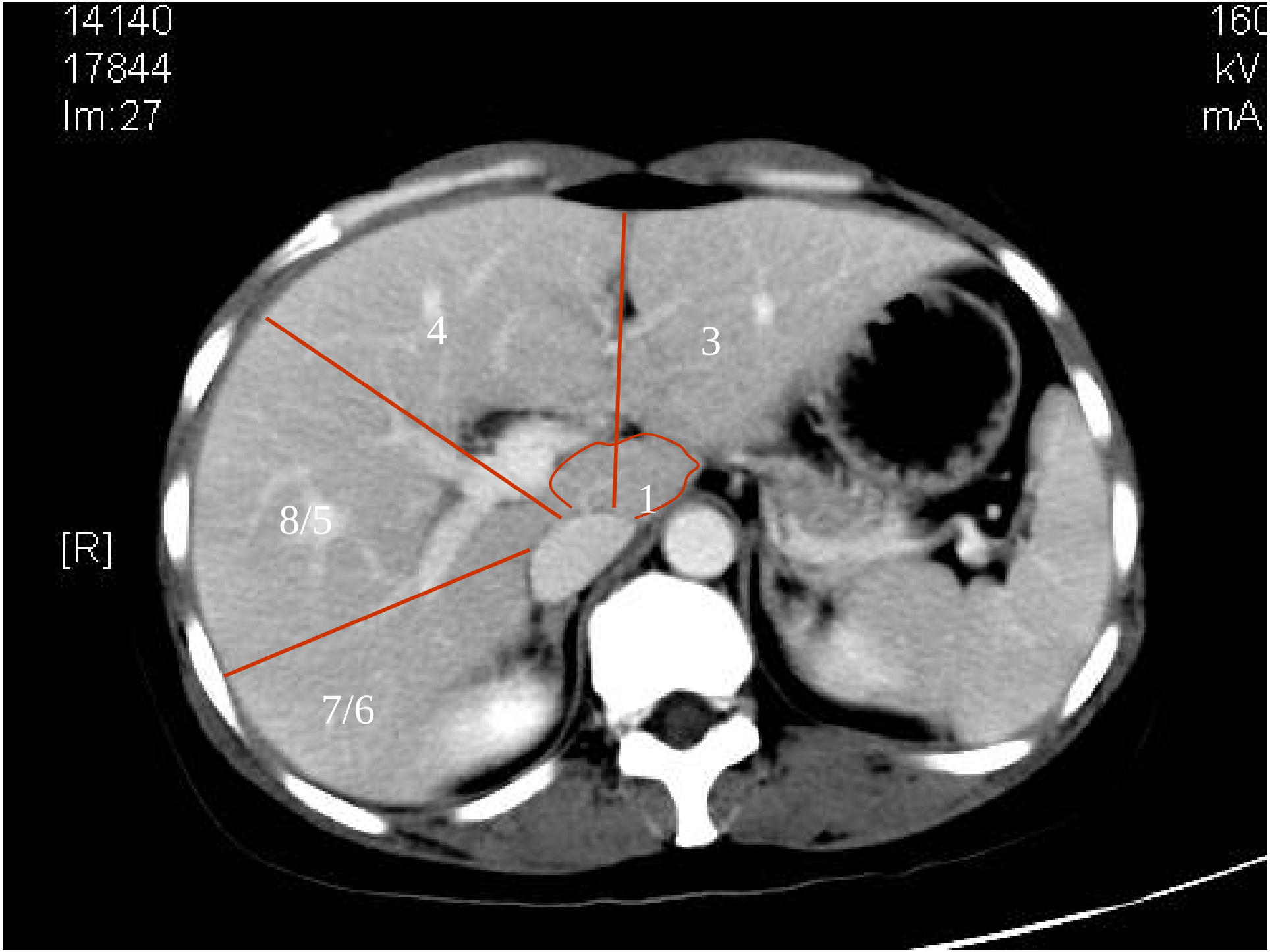
Im:26
kV
mA
[R]
4
2/3
1
8
7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kV
mA
4
3
1
8/5
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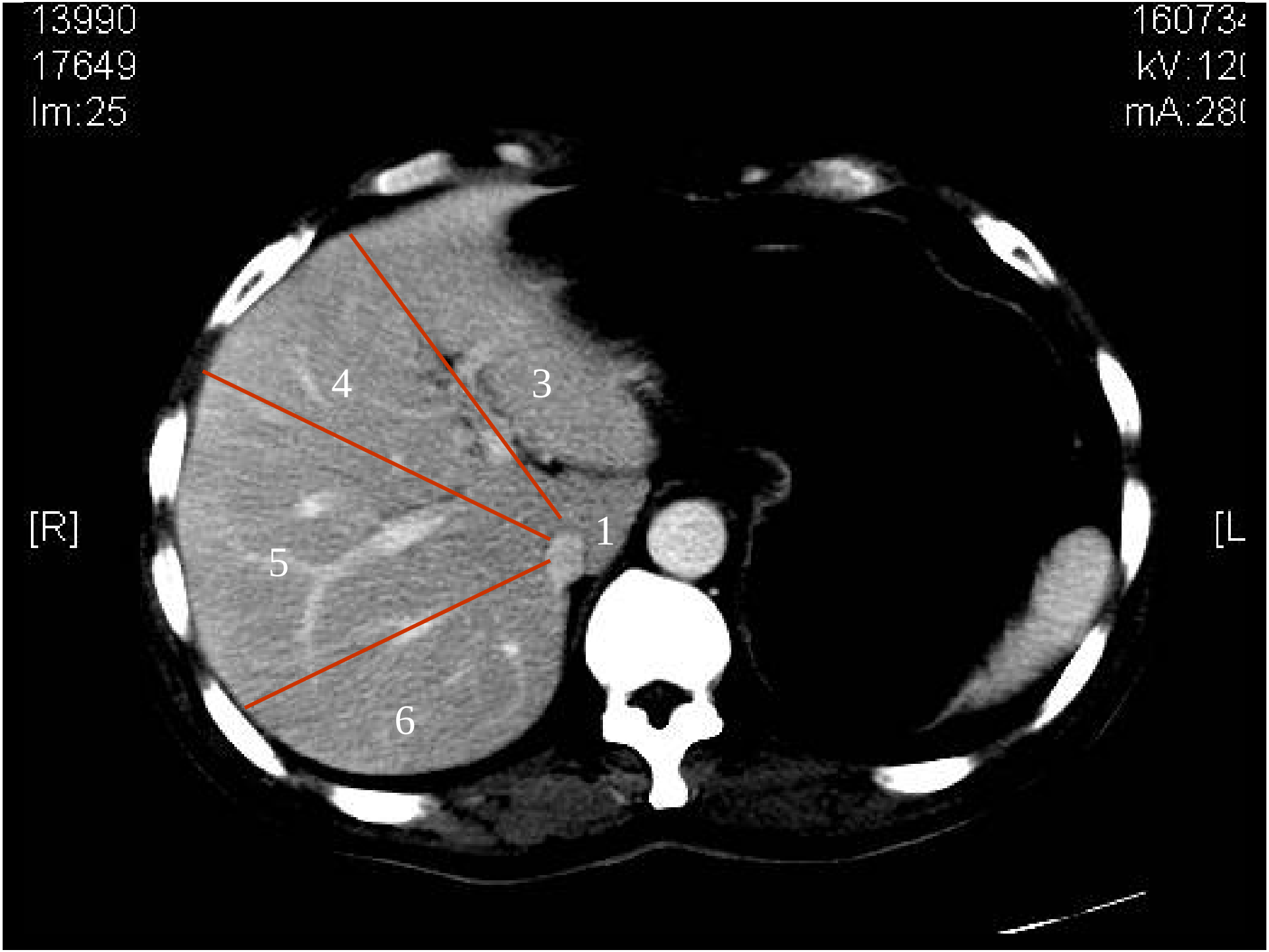
7/6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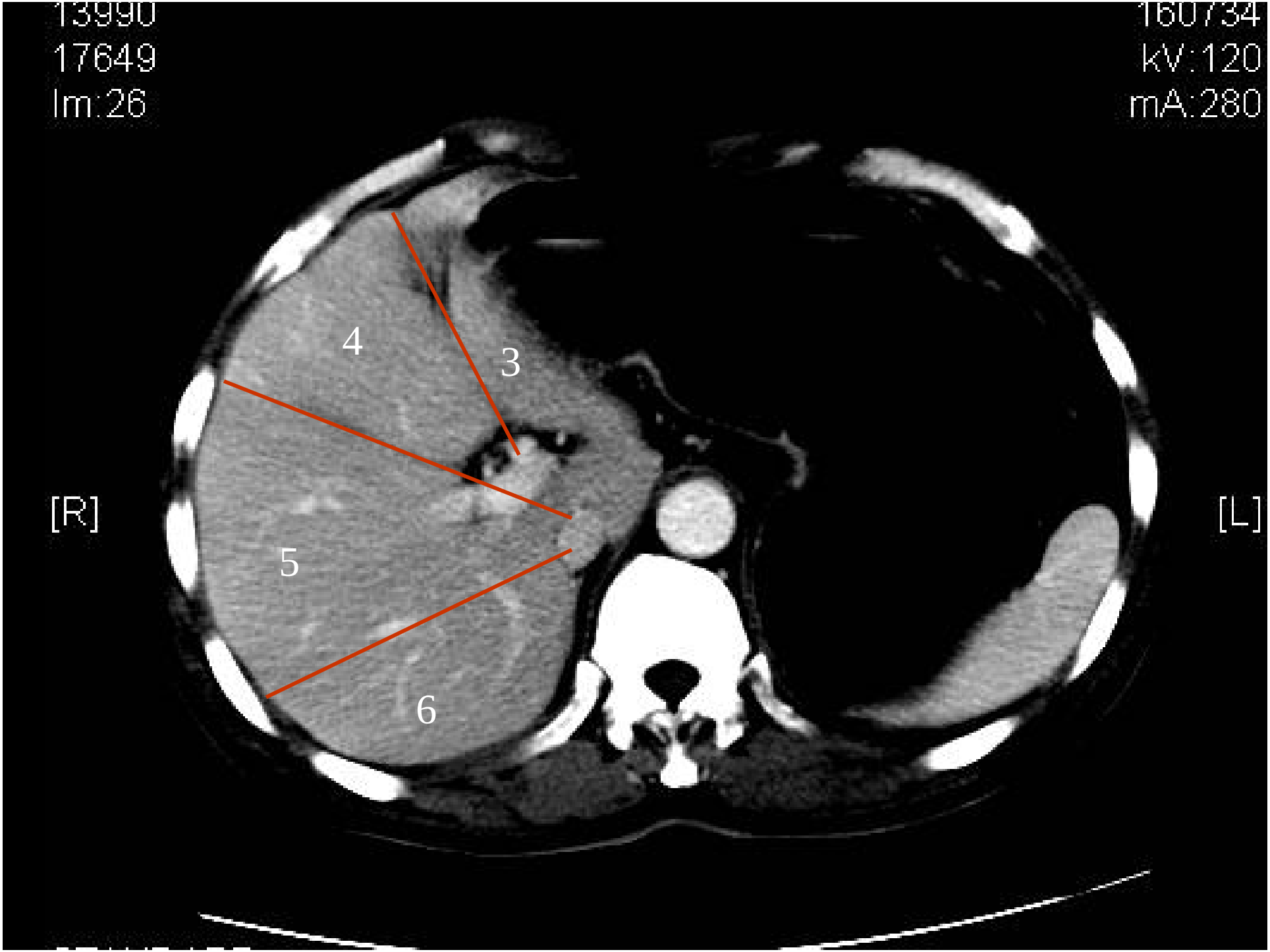
17649
Im:25
[R]
[L
4
3
1
5
6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17649
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160734
kV:120
mA:280
4
3
5
6
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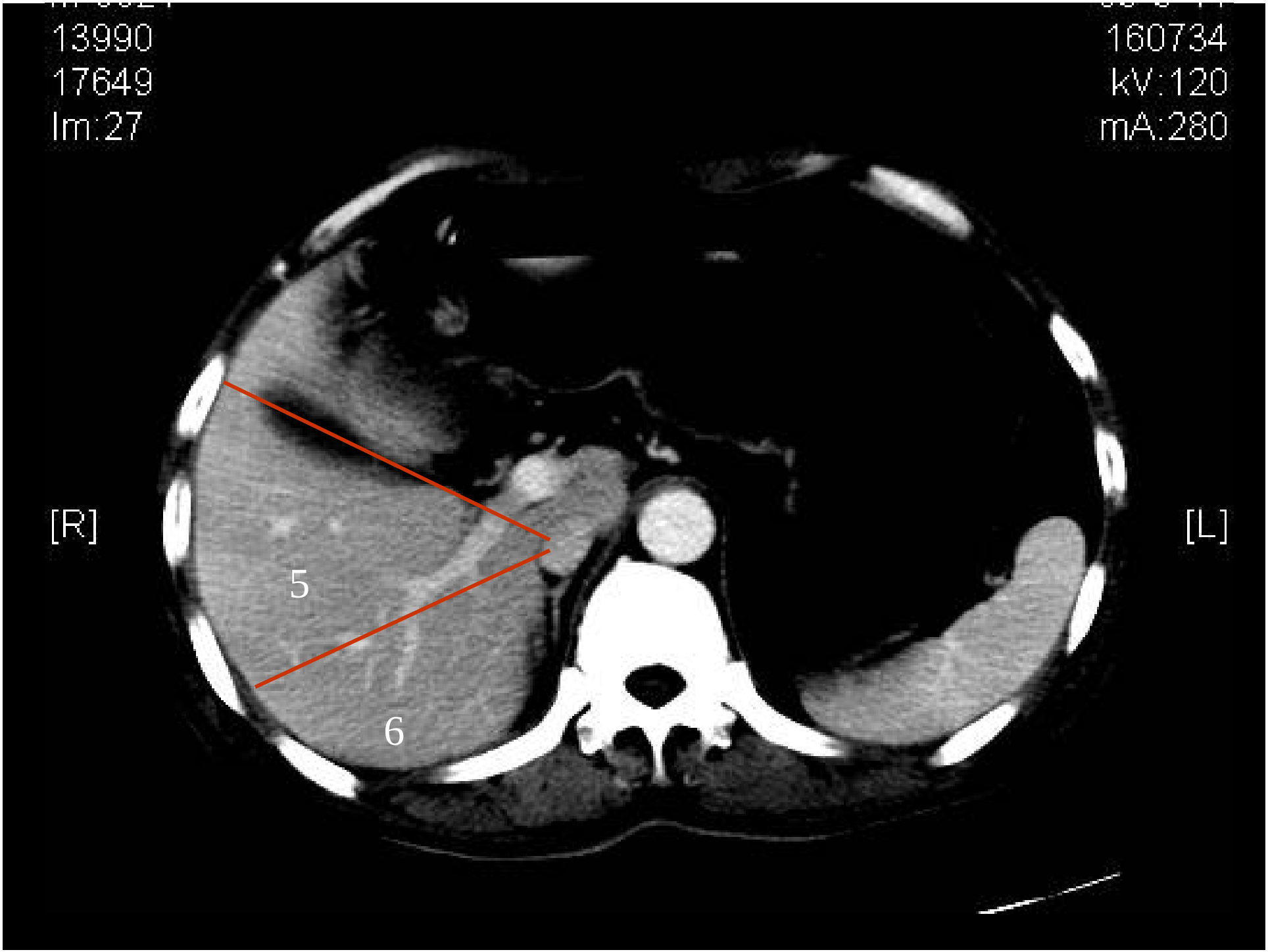
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160734
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[L]
5
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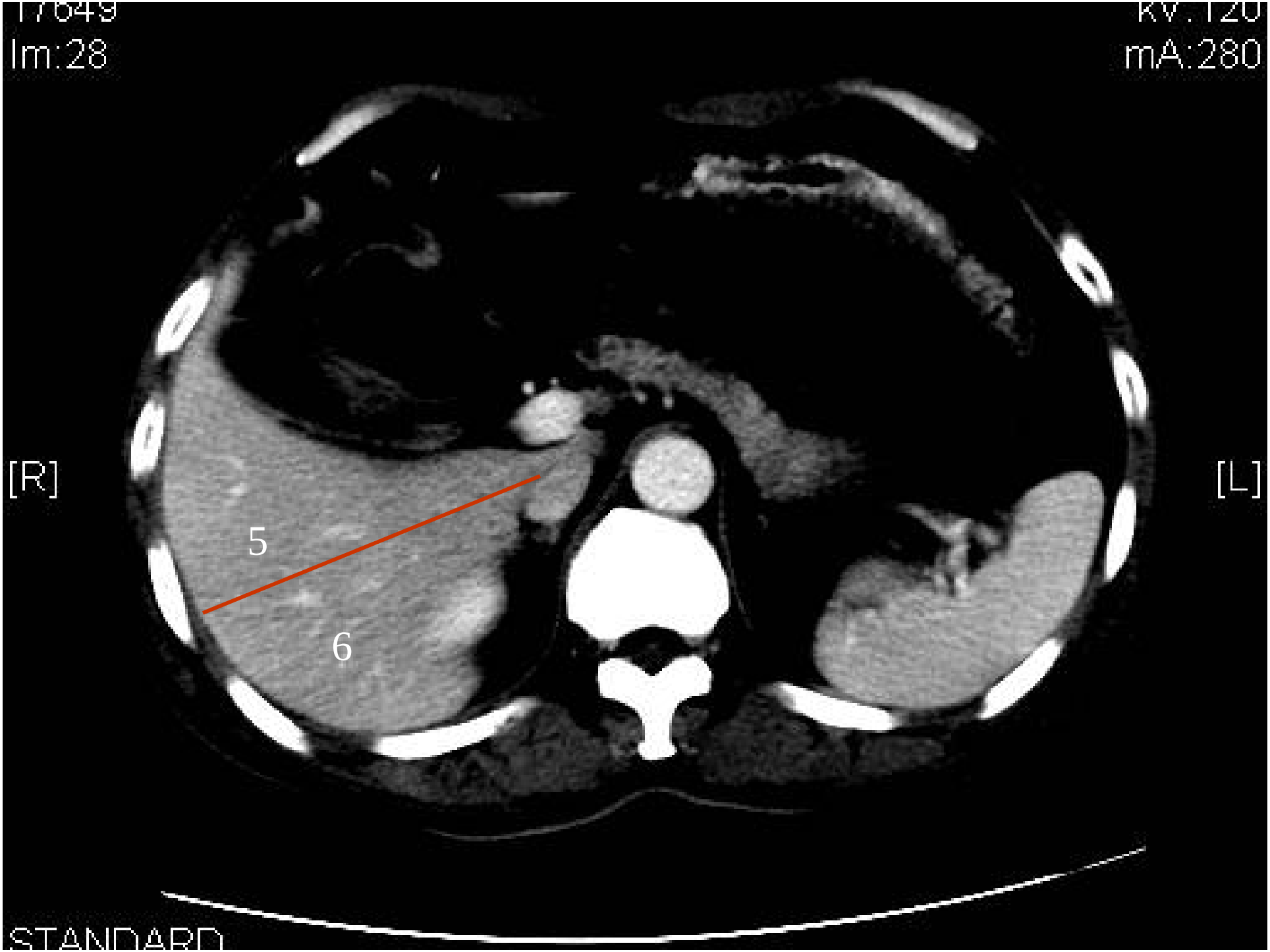

Im:28
mA:280
[R]
[L]
5
6
STANDARD

MR

二、MRI

1.MRI plain scan：

Sequence——axial、 coronal T1W、T2W

FIESTA、DWI、double echo

2. MRI enhancement scanning

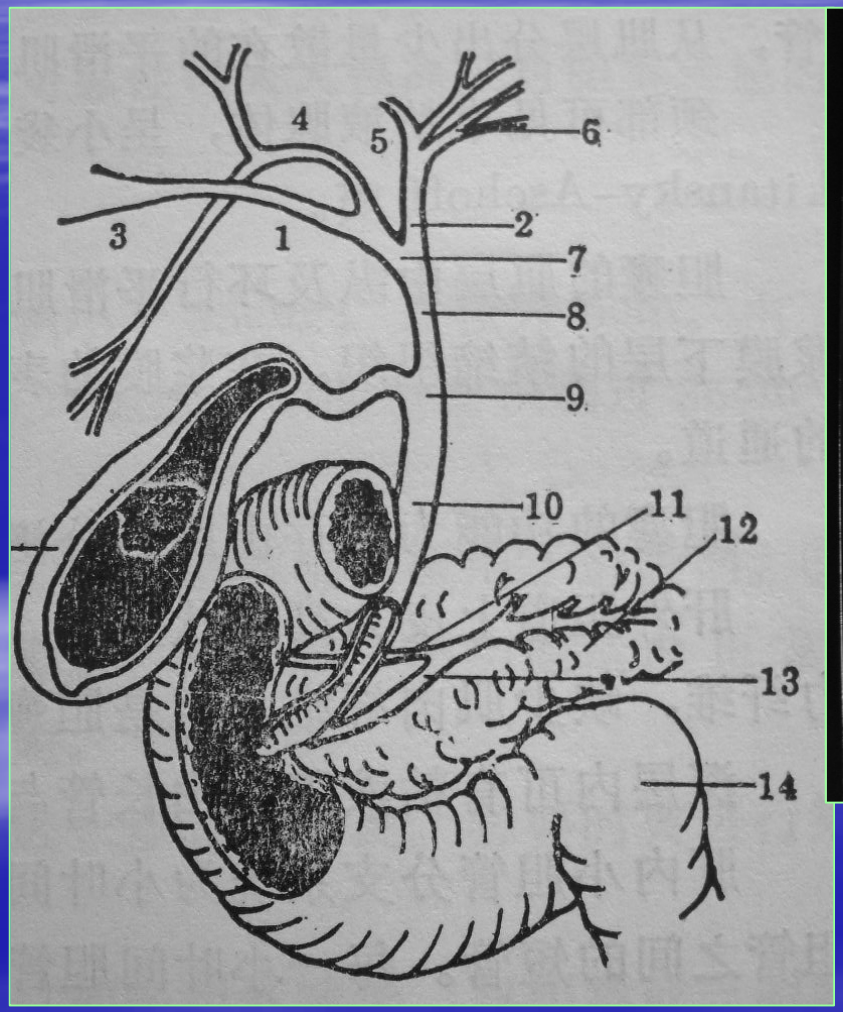
3. MRA

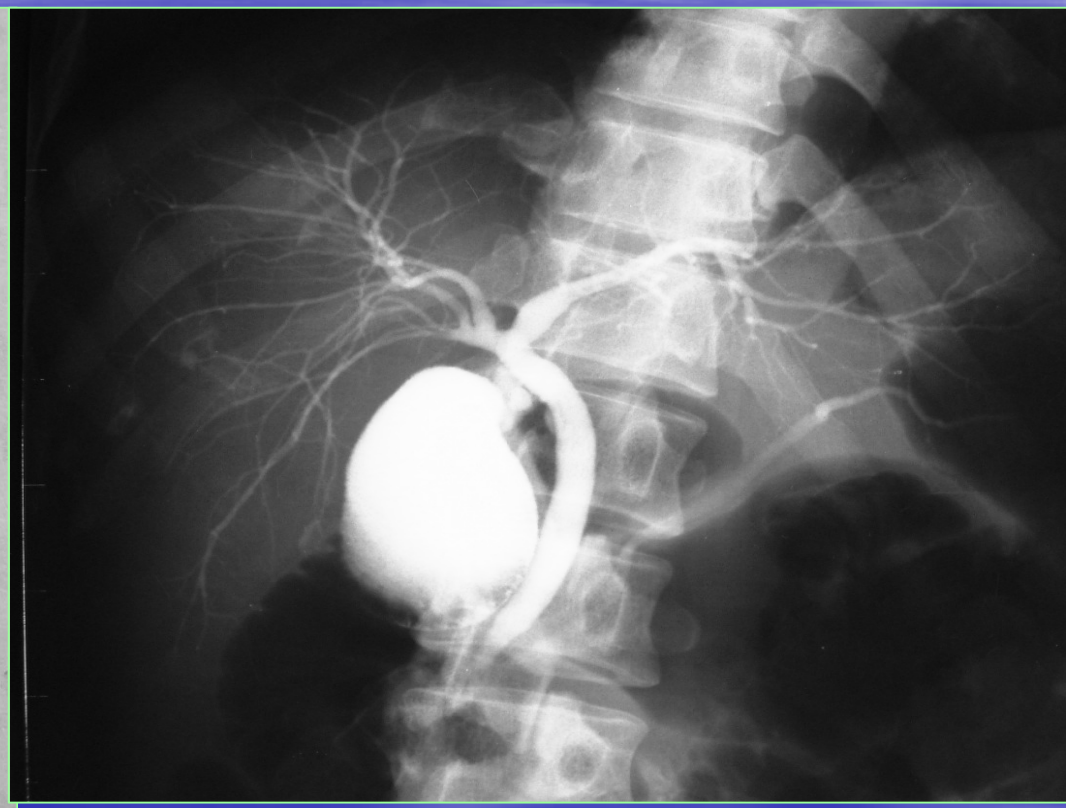
4. MRCP Magnetic Resonance Cholangiopancreatography

T2WI
A
3
4
5
6
L

T1WI
A
3
4
5
6
L

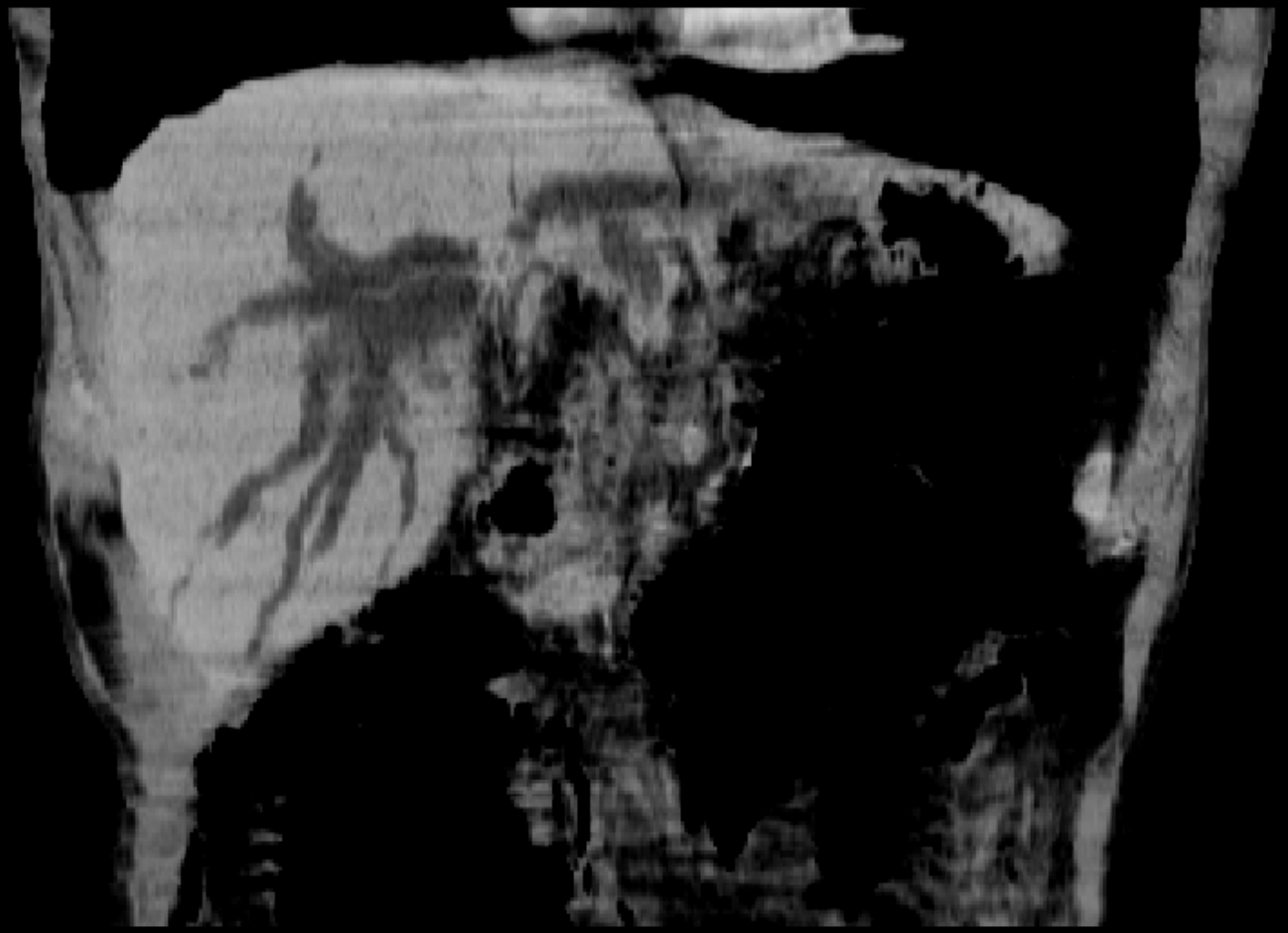
Bile duct system



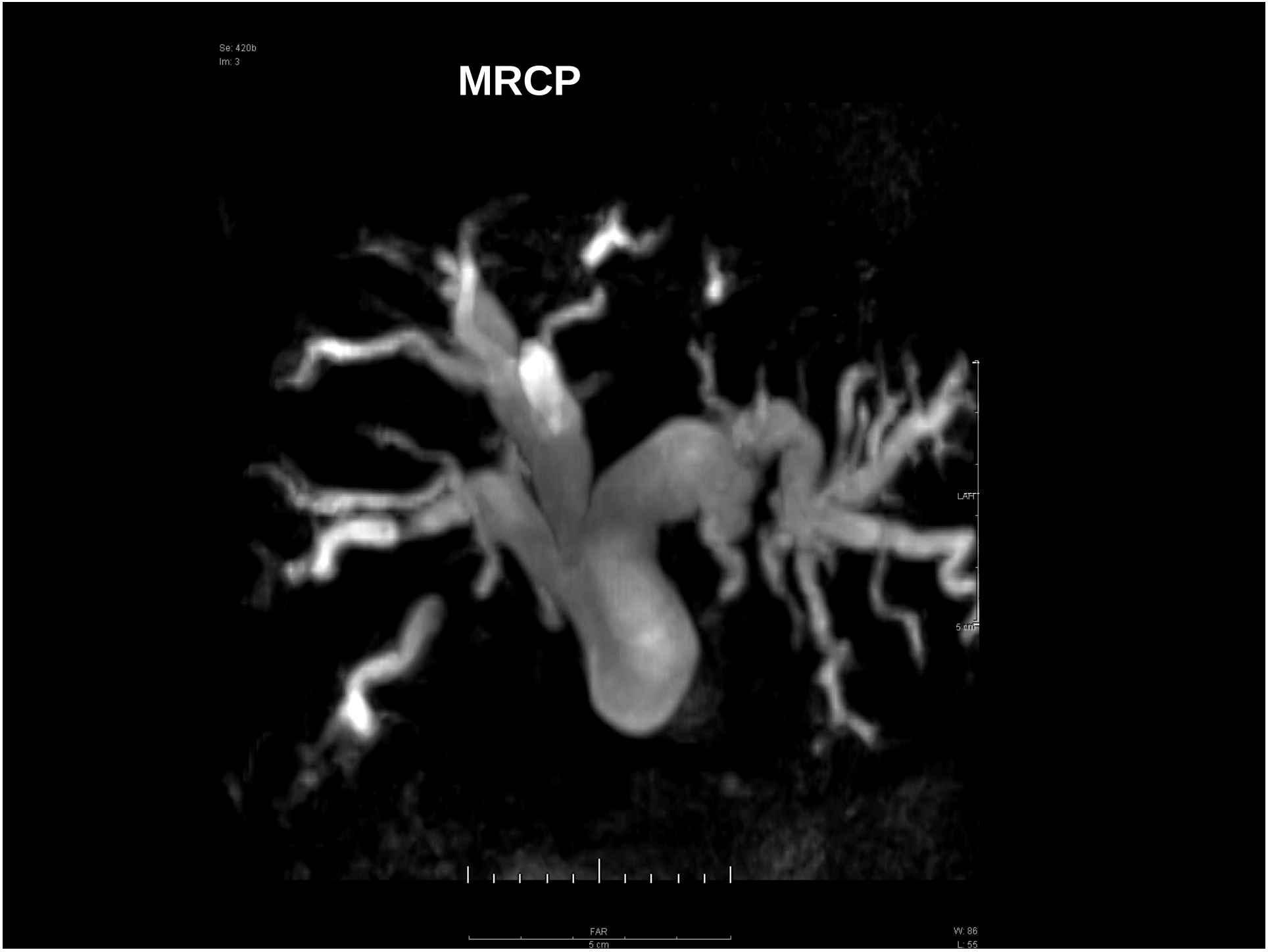


ERCP正常胆道

Intrahepatic bile duct

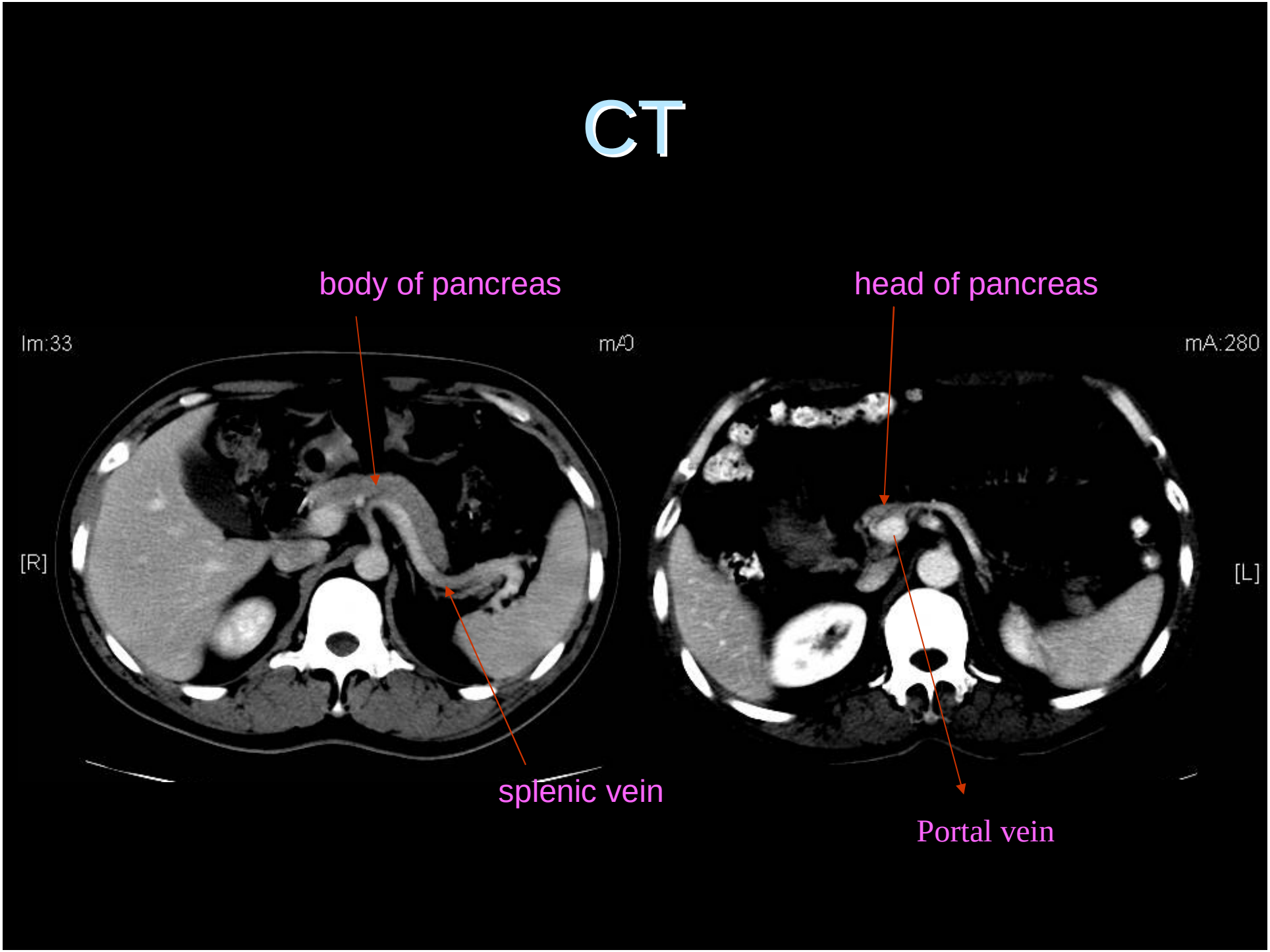


MRCP

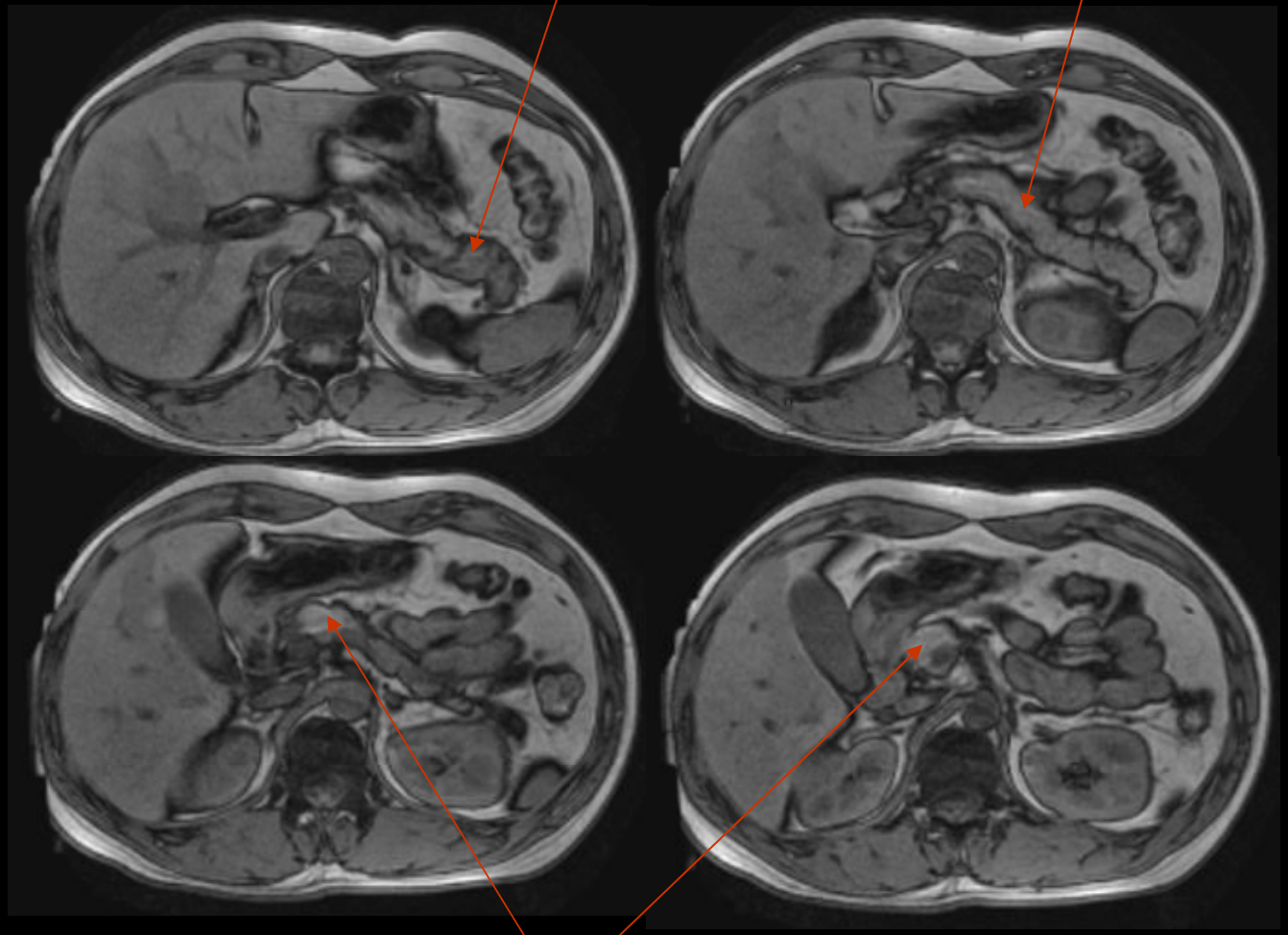


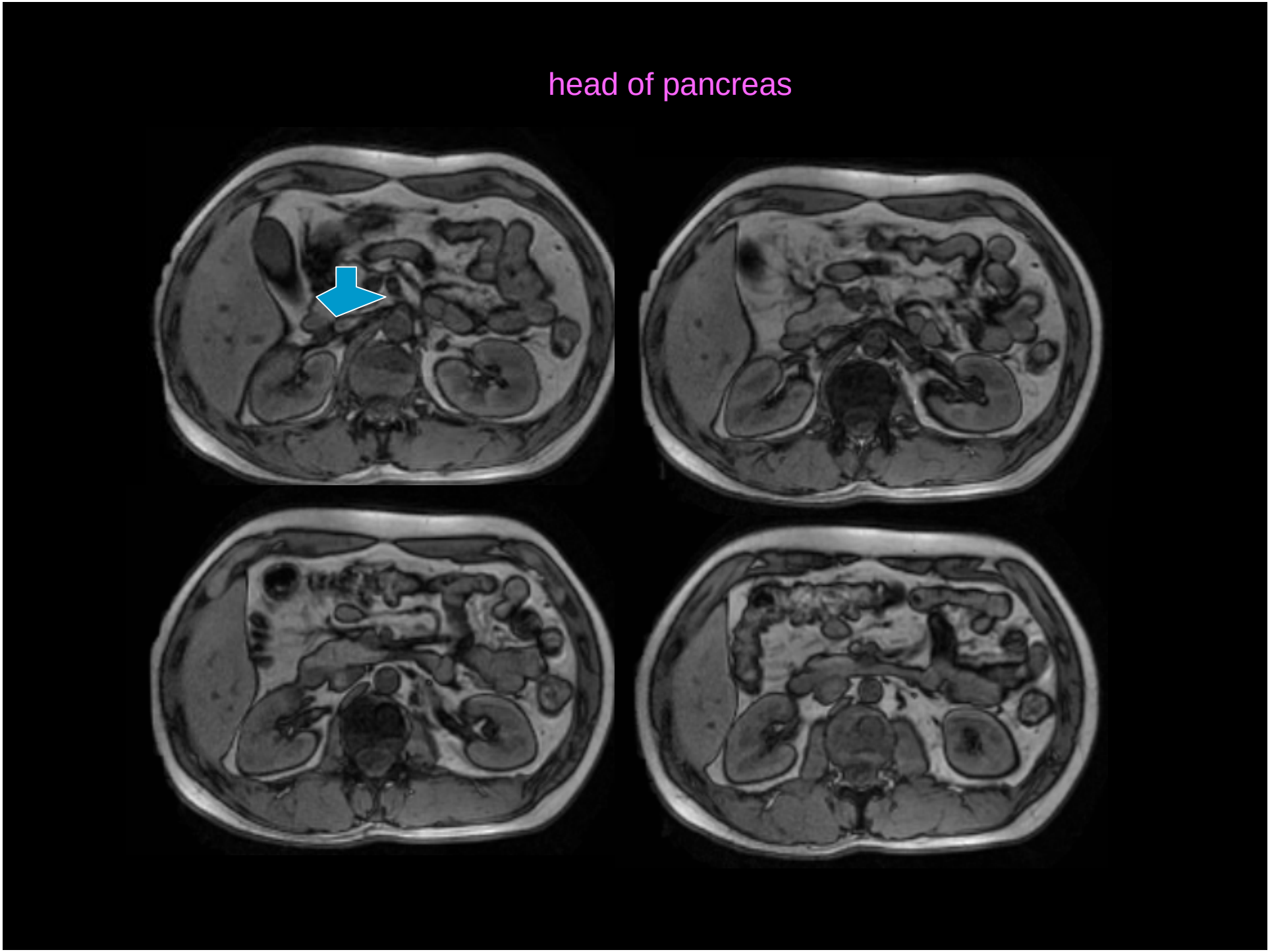
Pancreas

CT

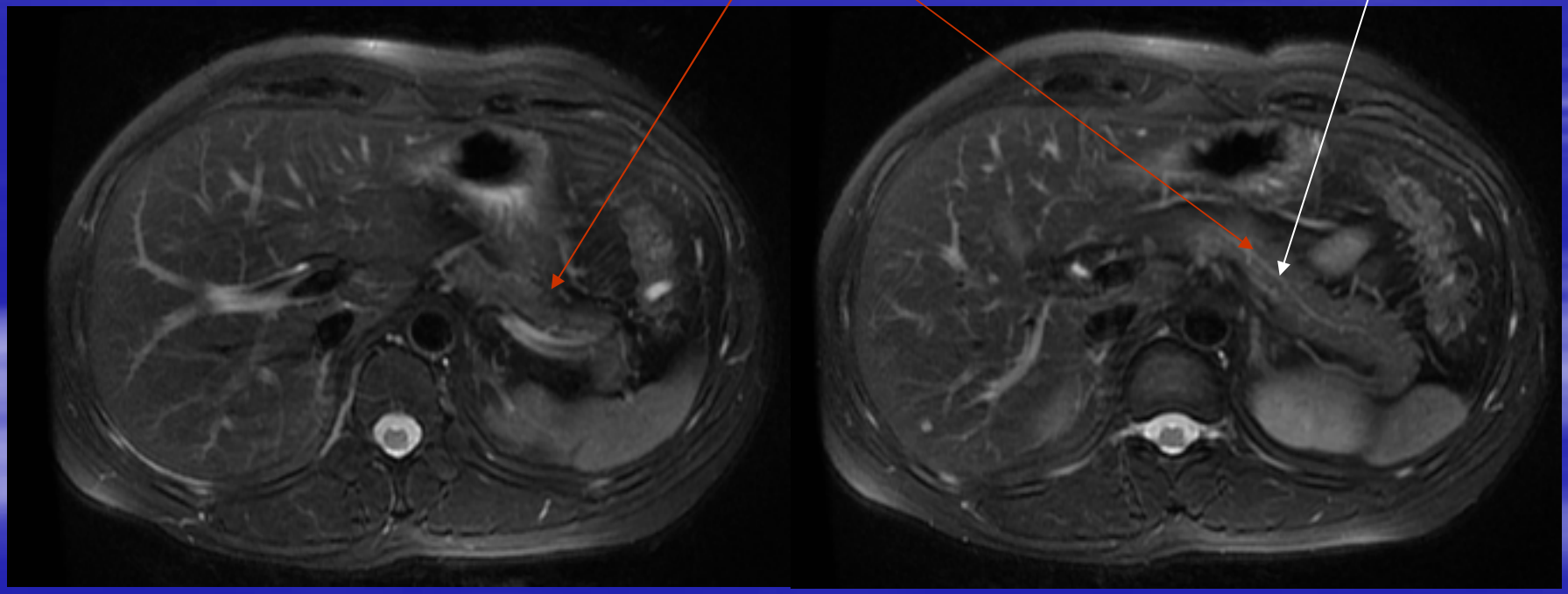

body of pancreas
head of pancreas
Im:33
mA:280
[R]
[L]
splenic vein
Portal vein

MR T1WI

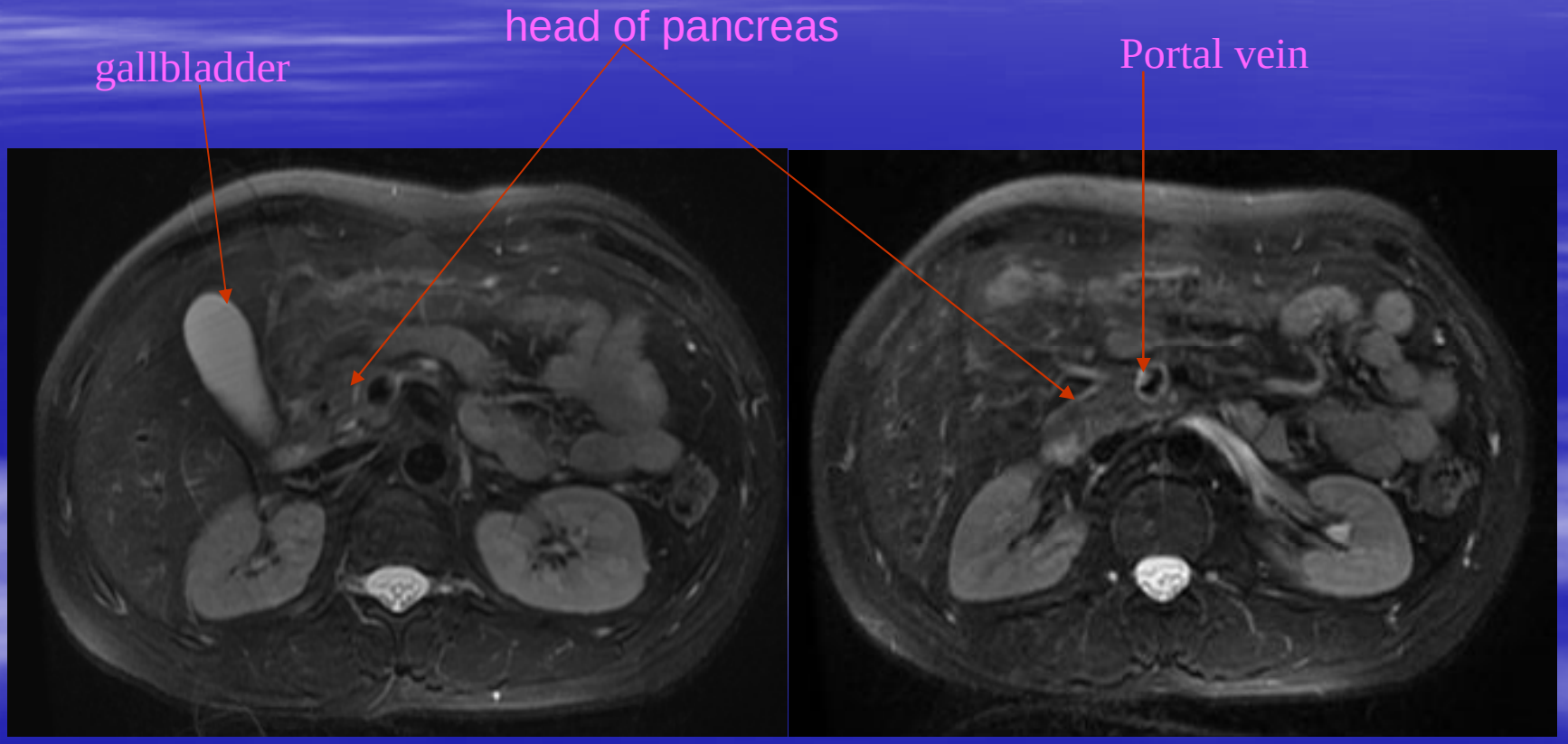



head of pancreas

T2 FAT SAT



胰头



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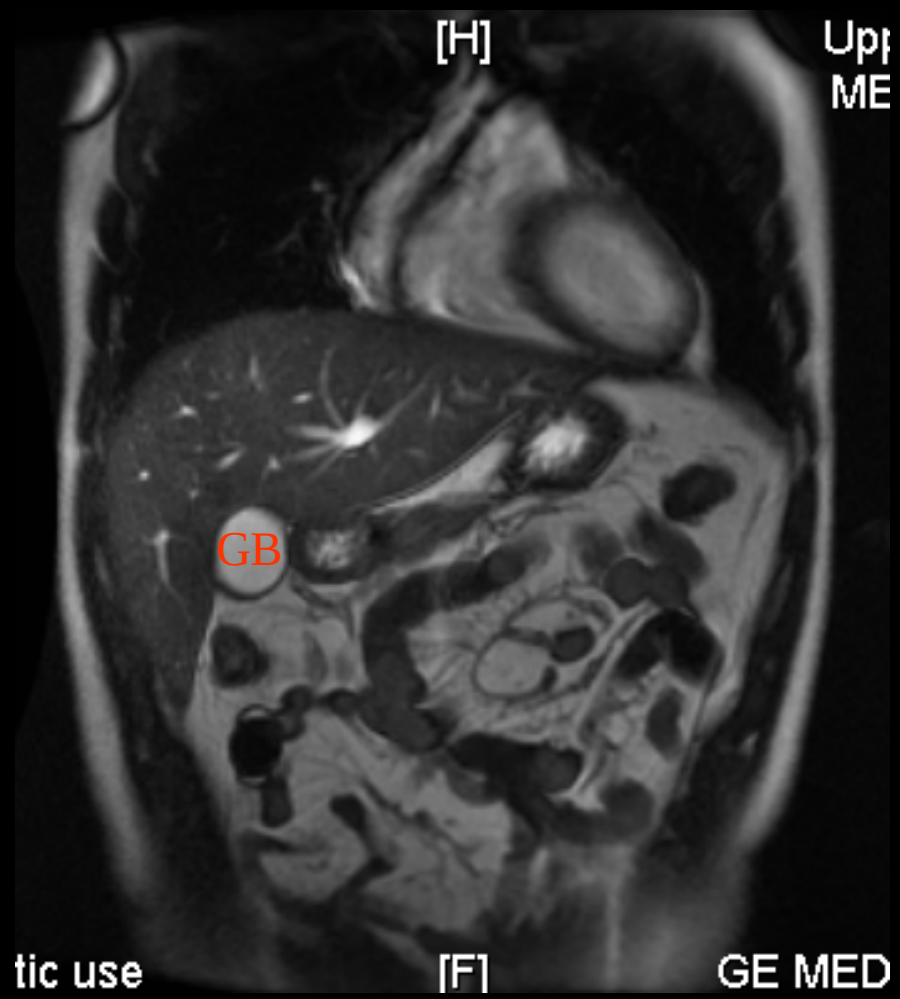

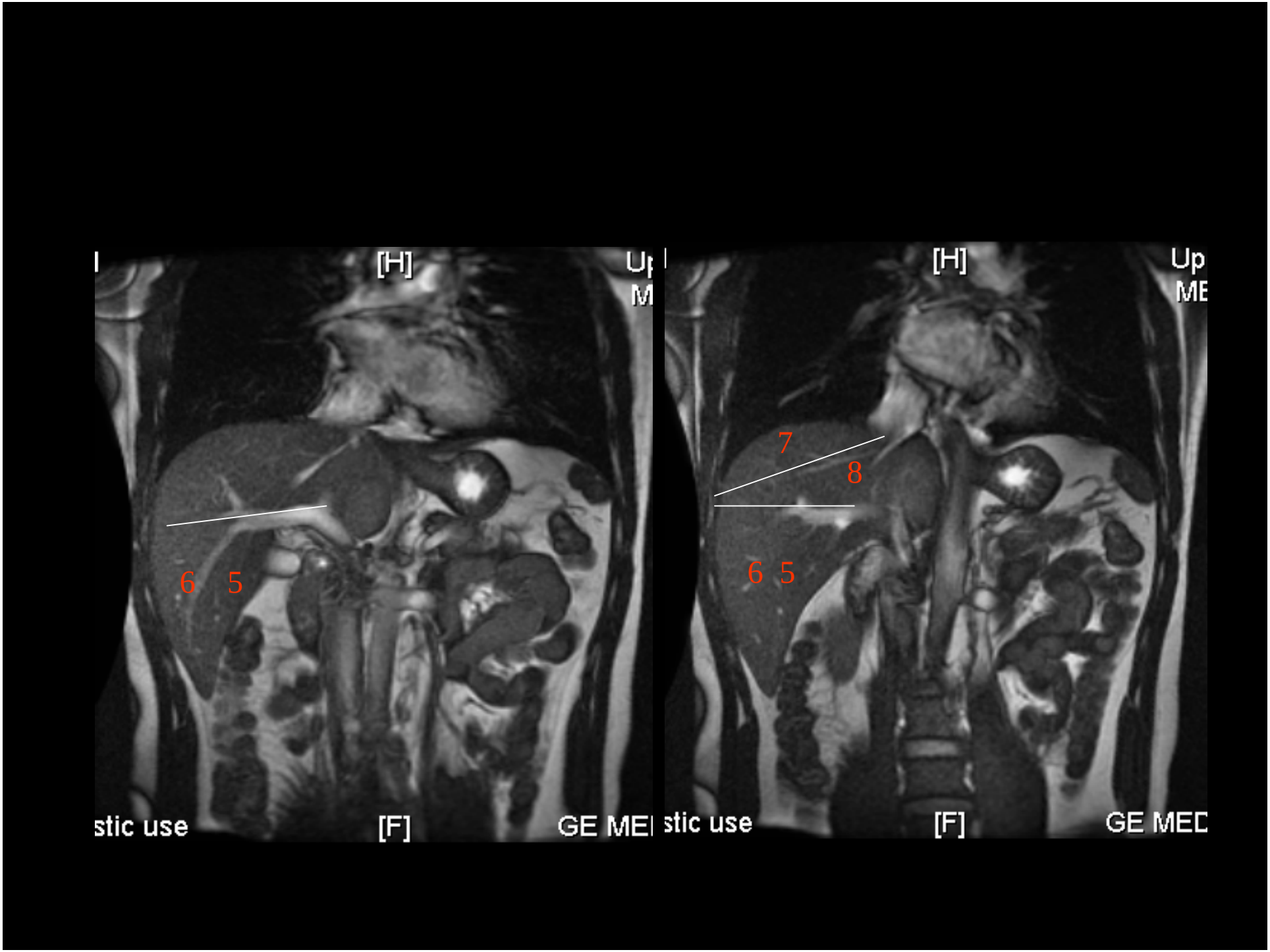
[H]
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6
5
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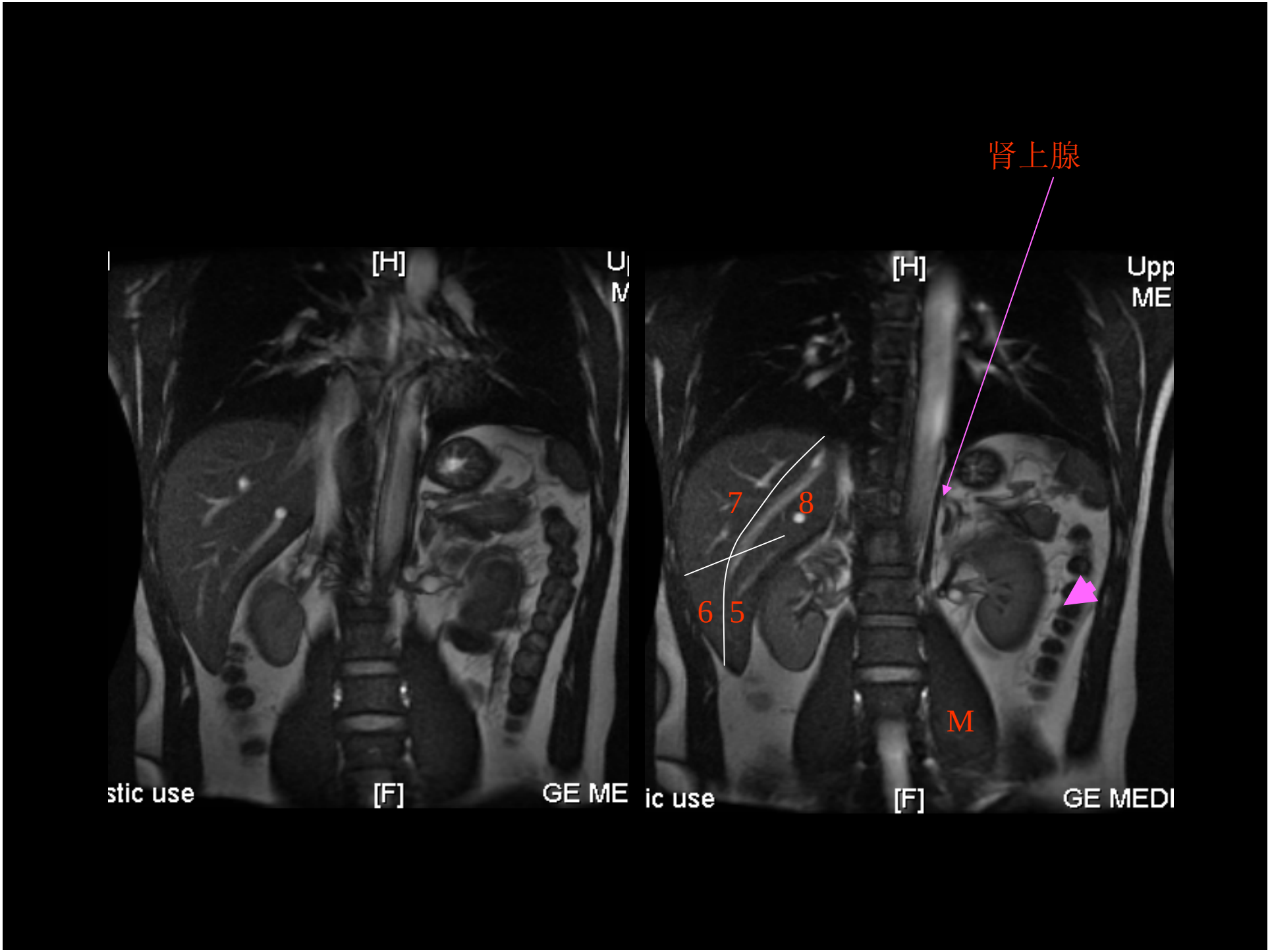
肾上腺
[H]
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8
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ME
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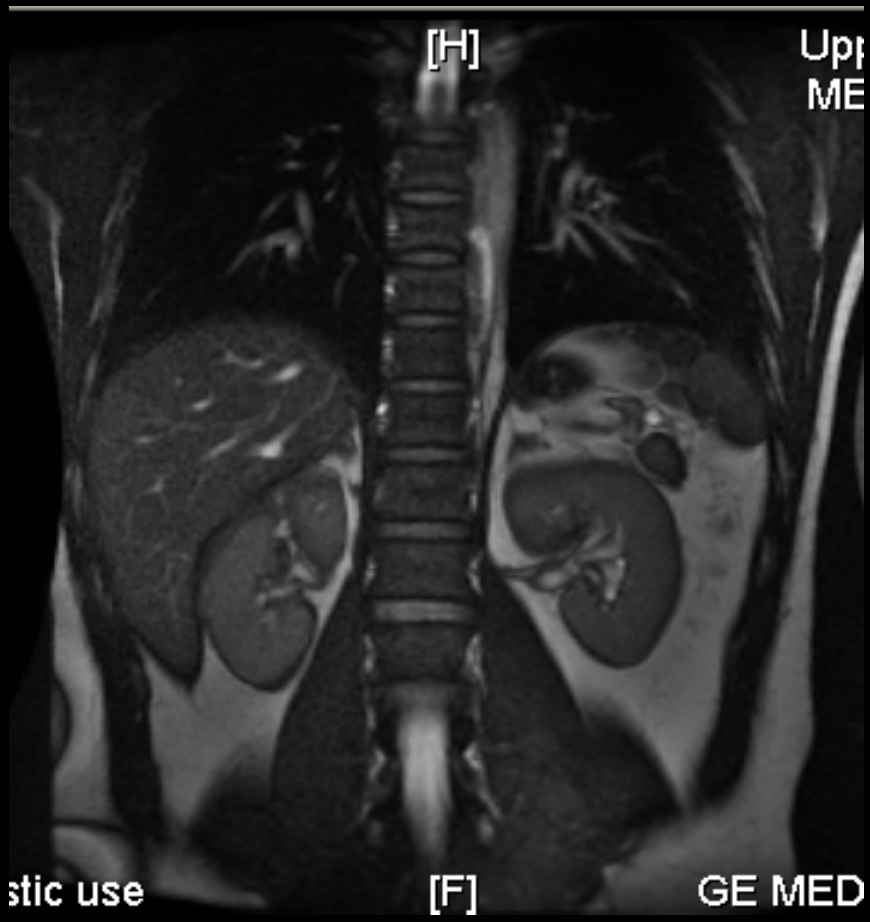
GE MEDI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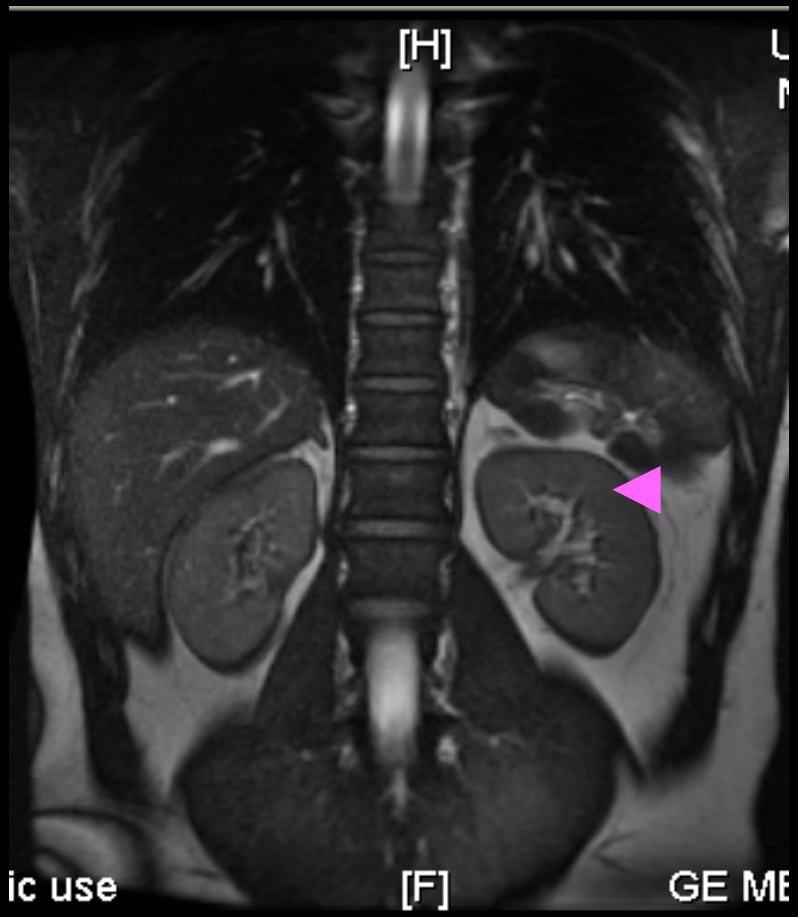
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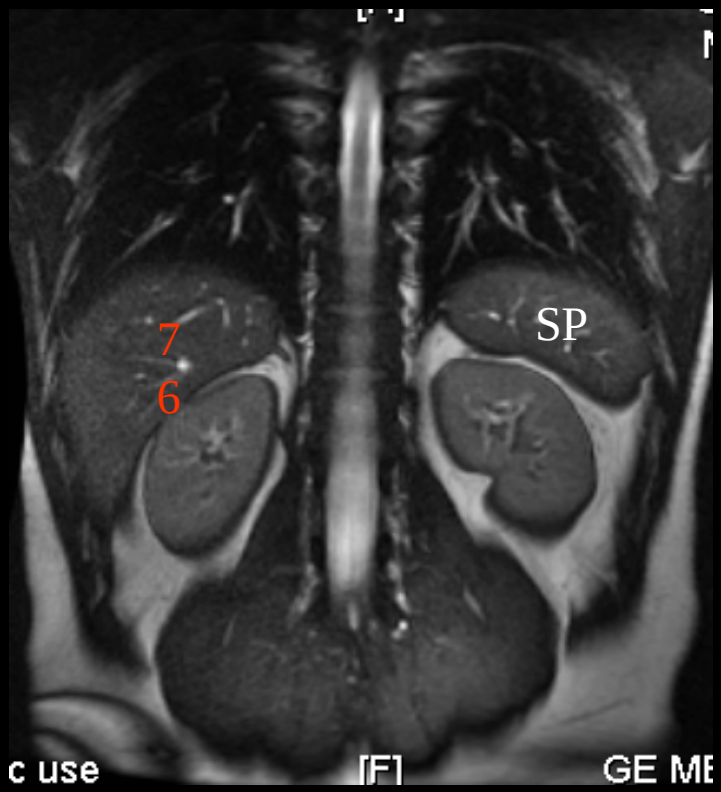

7
6
SP
c use
[F]
GE ME

[H]
ostic use
[F]
GE M

Disease of the liver

Hepatic cyst

- Congenital disease

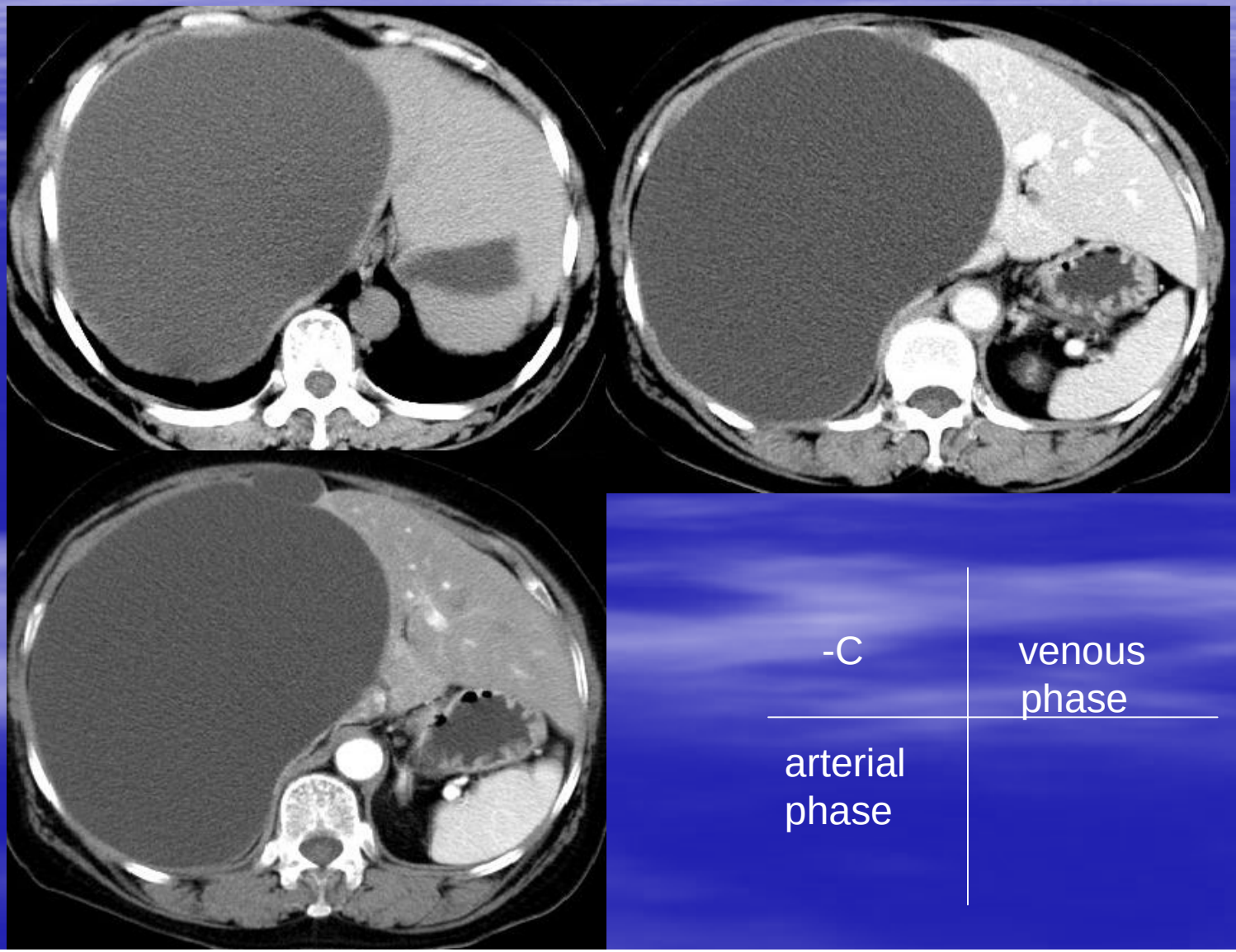
CT SCAN

- Delicate, round, smooth, thin-walled hypodense lesion
- Homogeneous,waterdensity(0-15HU)
- No enhancement

MR

- Very low signal intensity on T1WI and very high intensity on T2WI

CT Appearance Hepatic Cyst

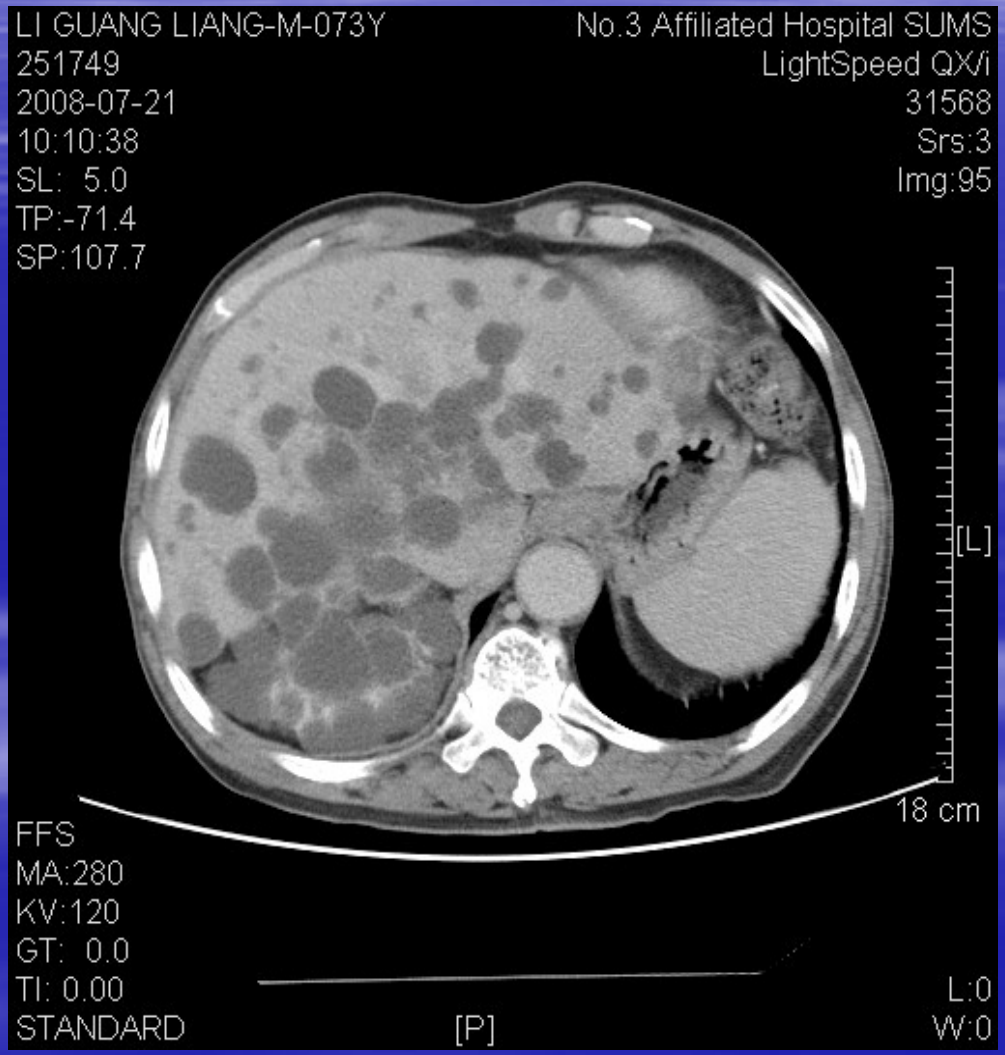


-C

venous phase

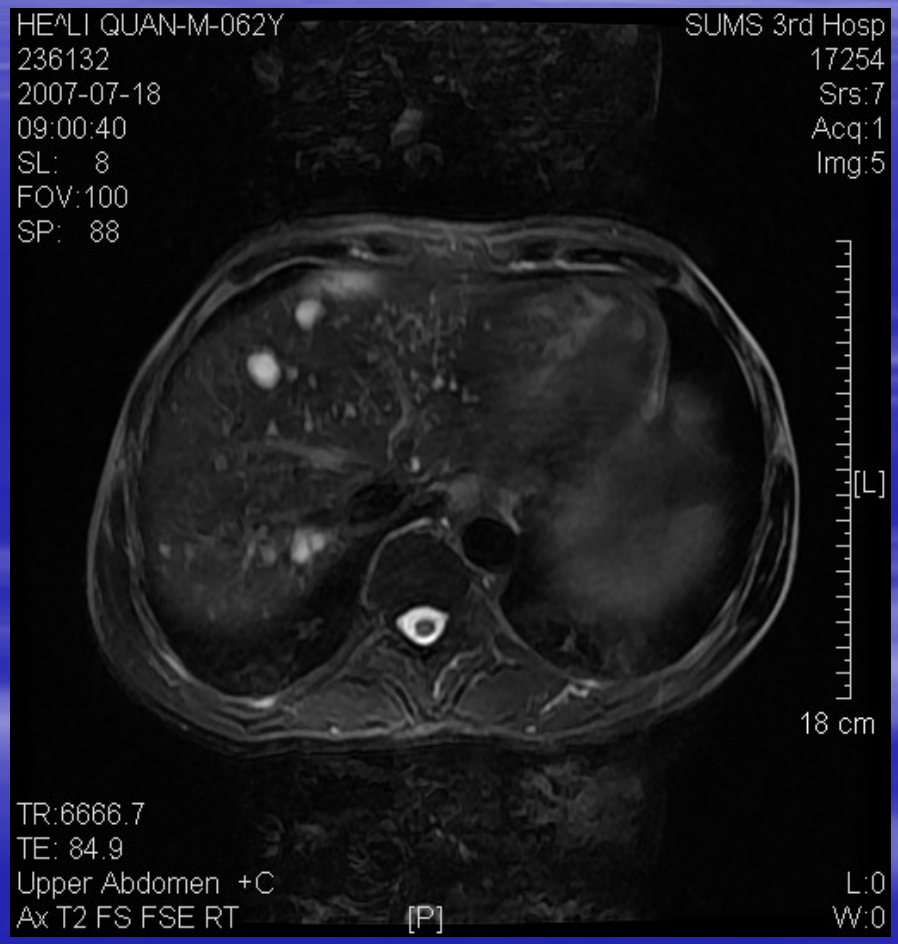
arterial phase

CT Appearance Hepatic Cyst



Polycystic disease

MR appearance Hepatic cyst



Hepatic Abscess

Pyogenic abscess—bacterium **or** Amoeba

Plain Radiography

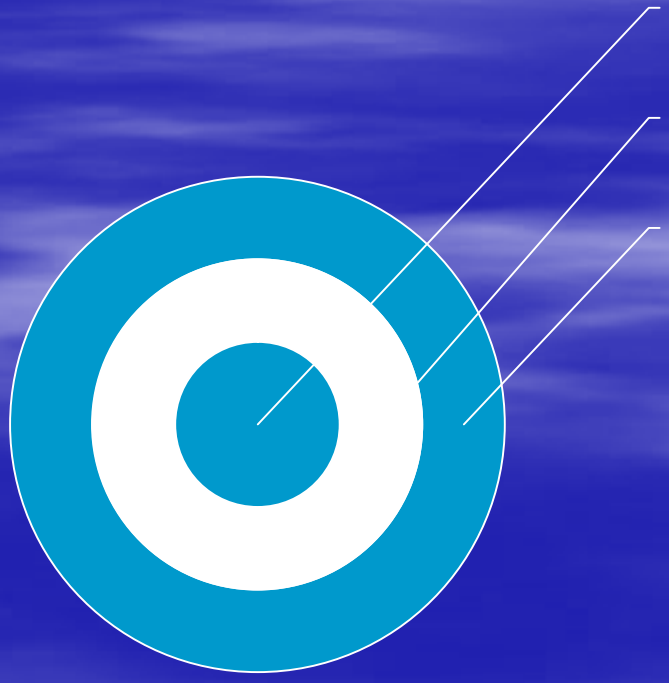
CT Appearance of hepatic abscess

- Hypodense –hyperdense –hypodense

necrosis membrane edema

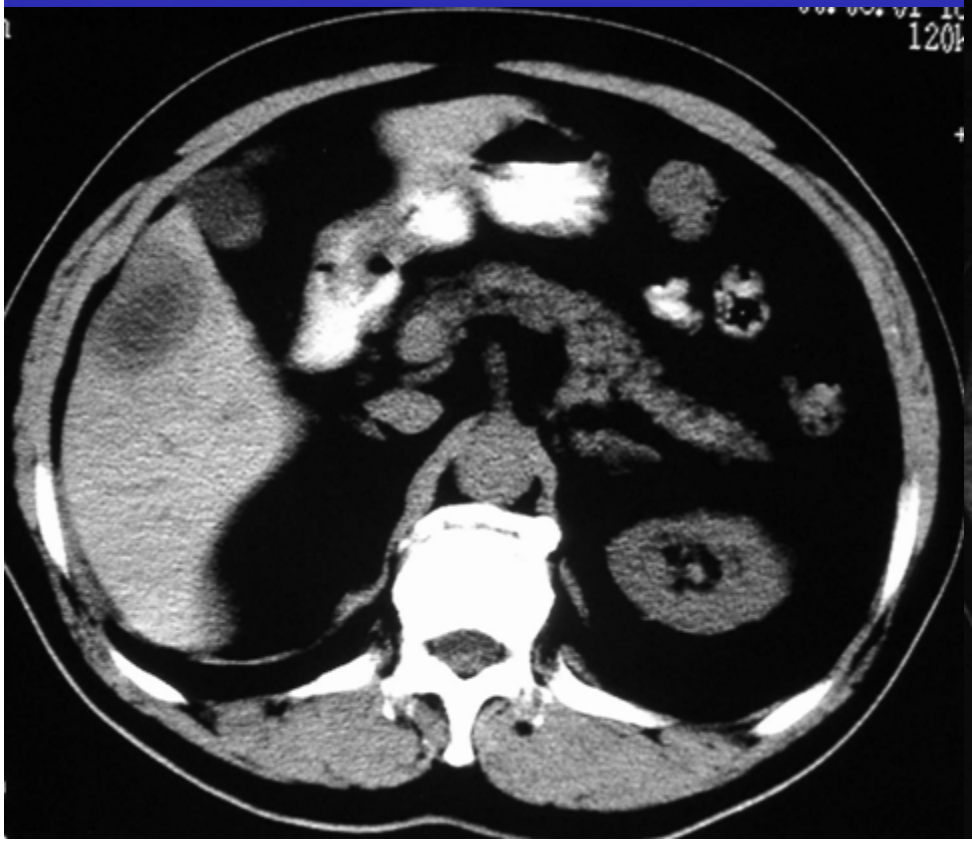
20-40HU

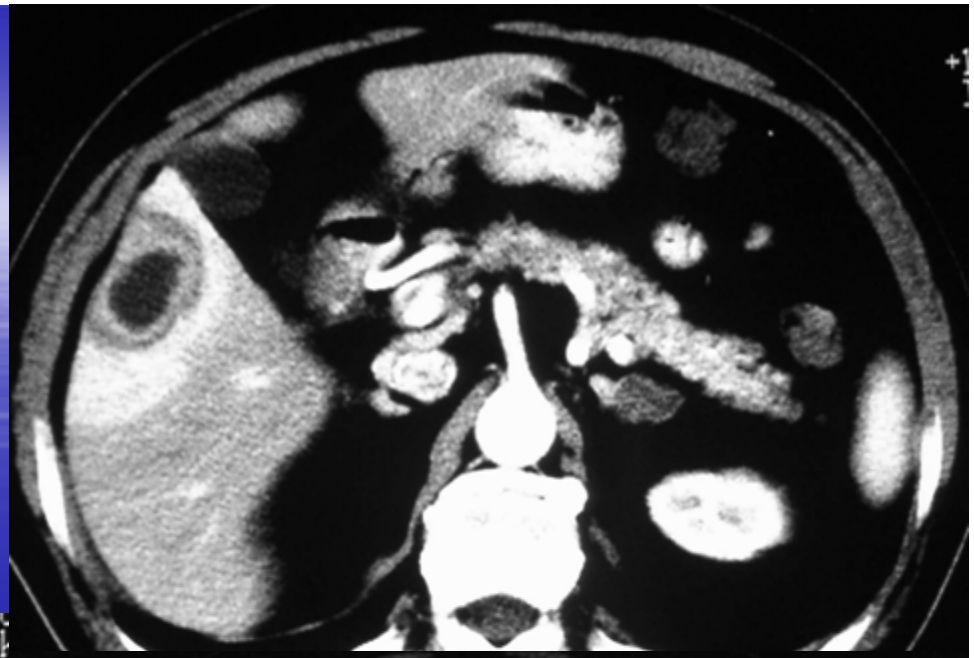
Gas or fluid level



肝脓肿

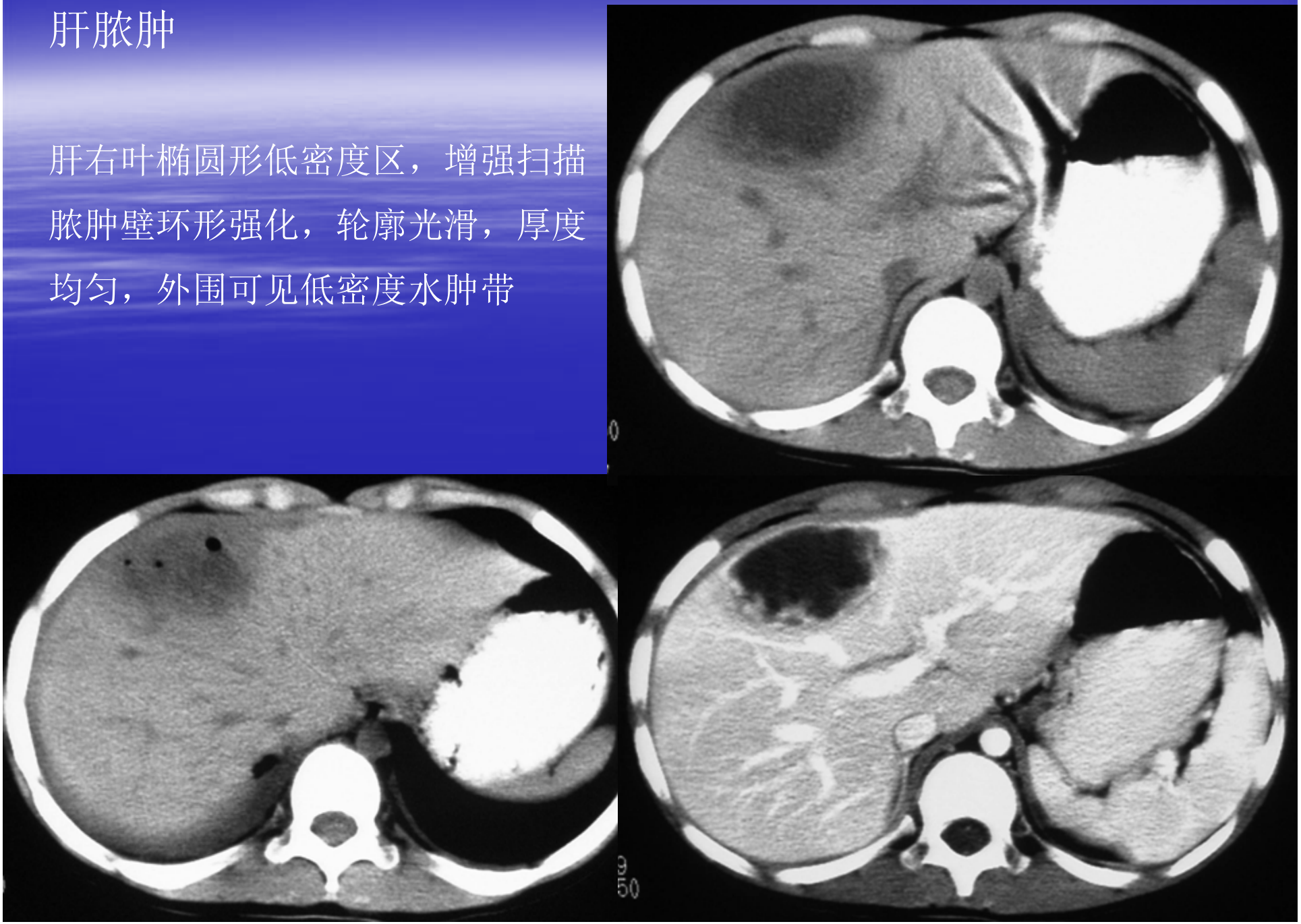
肝右叶圆形低密度区，脓肿壁密度高于脓腔、低于正常肝。增强扫描：脓肿壁环形强化，轮廓光滑，厚度均匀，外围可见低密度水肿带





肝脓肿

肝右叶椭圆形低密度区，增强扫描脓肿壁环形强化，轮廓光滑，厚度均匀，外围可见低密度水肿带

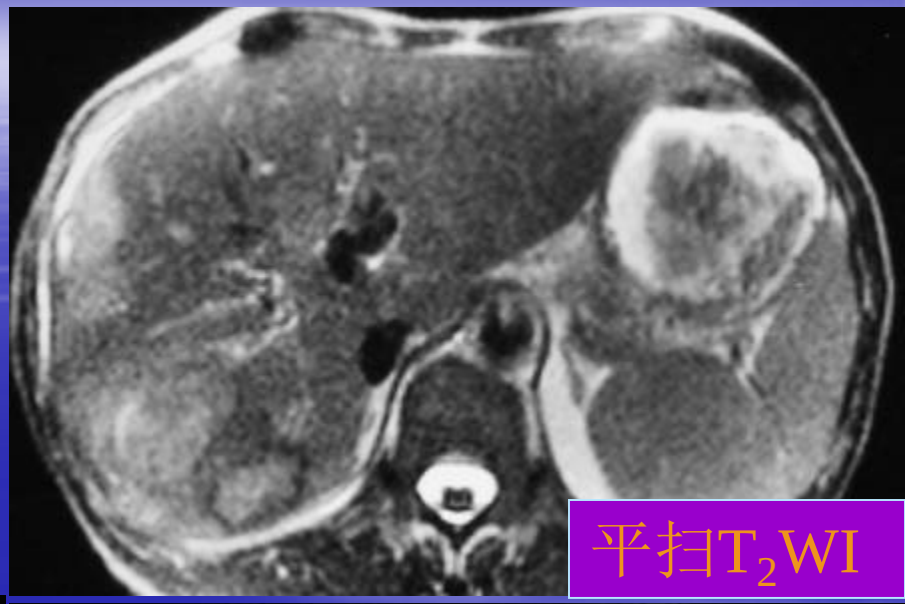


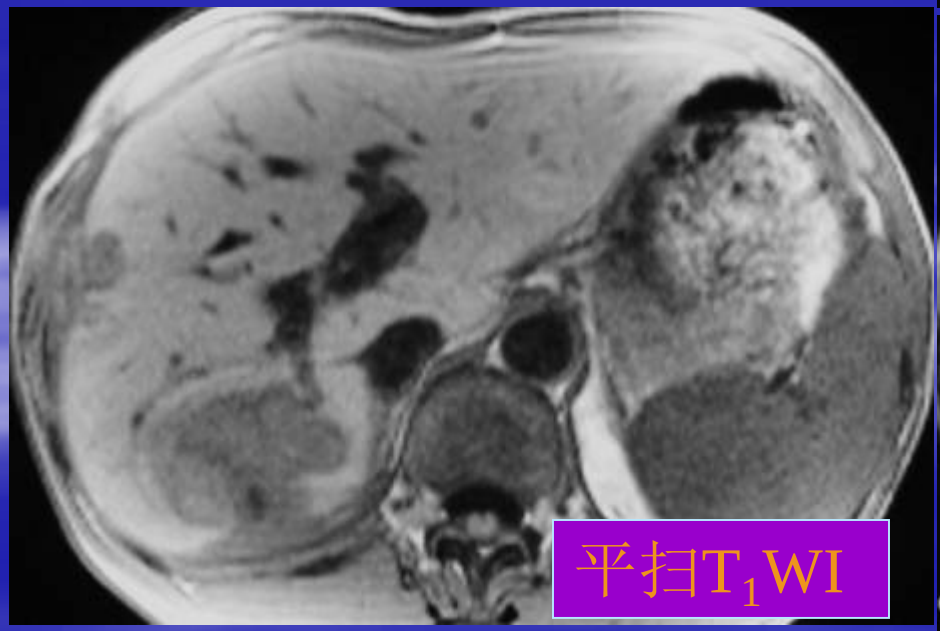
MR Appearance of abscess

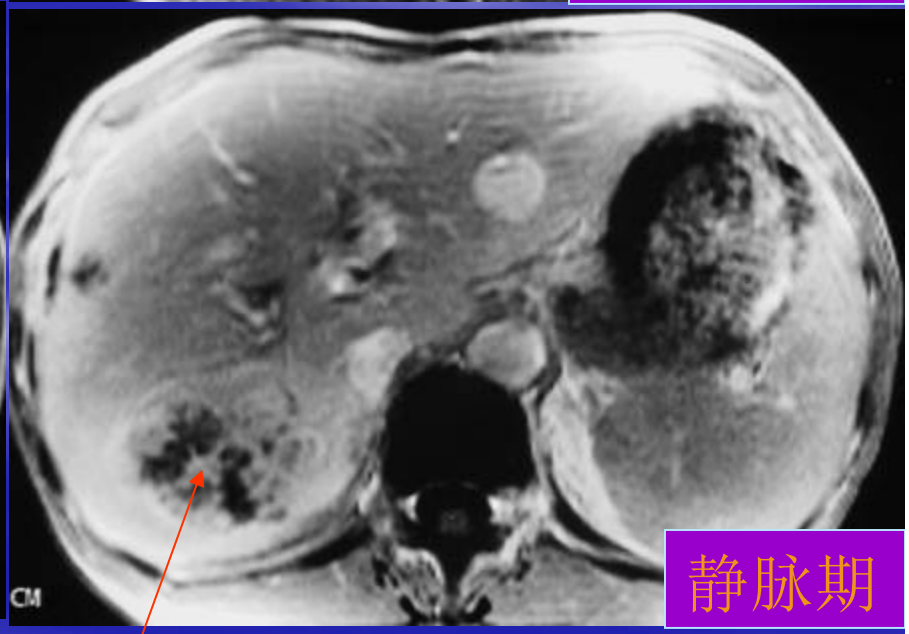
- low signal intensity on T1WI and high intensity on T2WI---inside cavity
- Intensity is decreased than the center in the wall

肝脓肿

肝右叶两个不规则形异常信号区，T_1WI脓肿壁信号高于脓腔、低于正常肝，T_2WI反之。增强扫描：脓肿壁环形强化，轮廓不光滑，边缘不整







Common hepatic tumors

- Benign tumor

  Cavernous hemangioma

  Hepatocellular adenoma

  Hamartoma

  Focal nodular hyperplasia（FNH）
- Malignant tumour

  Hepatocellular carcinoma

  Cholangiocellular carcinoma

  Liver metastasis

Hemangiomas of liver

Hemangiomas is the most common benign tumor of the liver-- Cavernous hemangioma

CT appearance of hemangiomas

A. Plain scan

1、Low density，**CT value-about 30HU**

2、Homogeneous **(In**homogeneous**-centrally lower density in large tumor, Ca or hemorrage)**

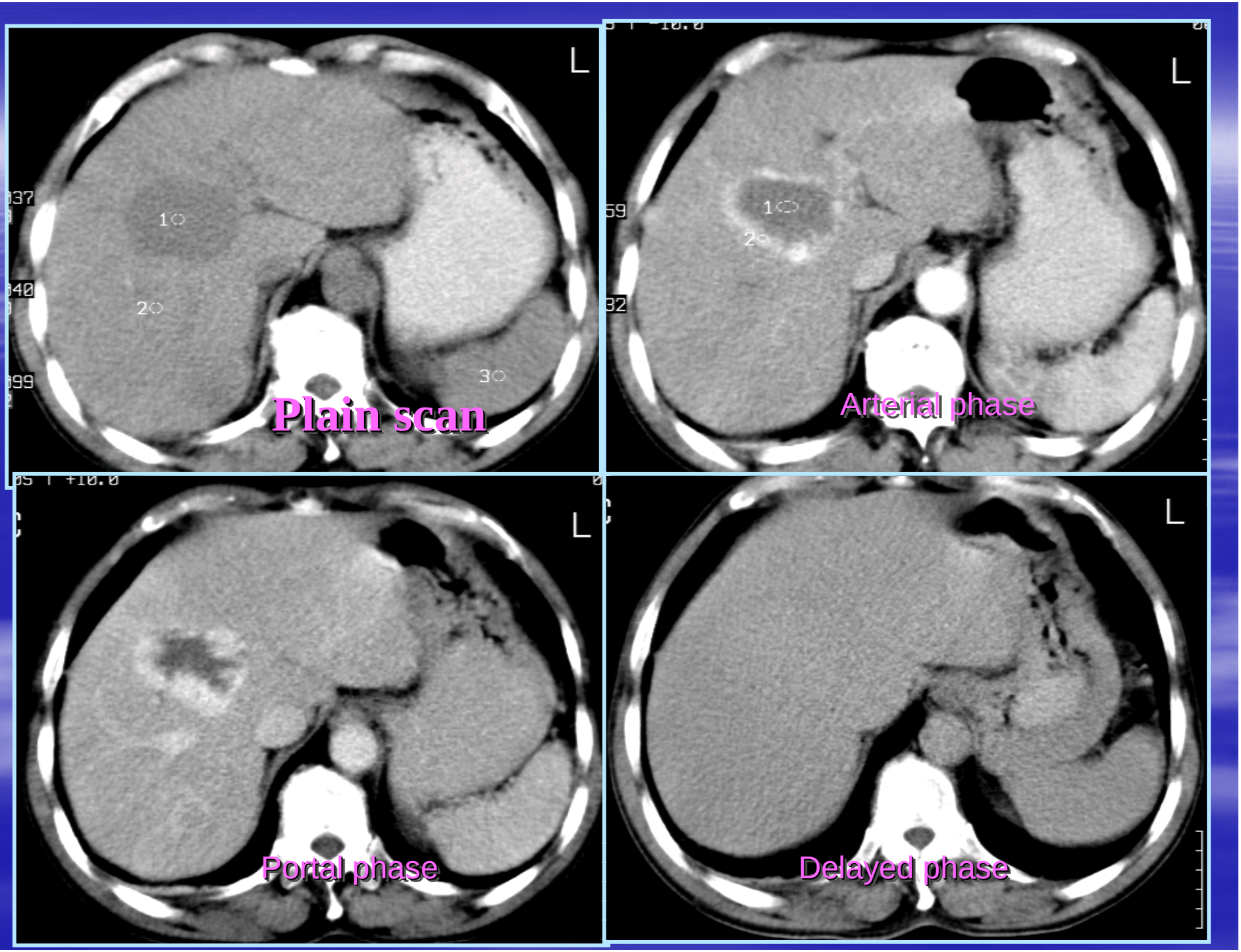
B. Enhancement scanning

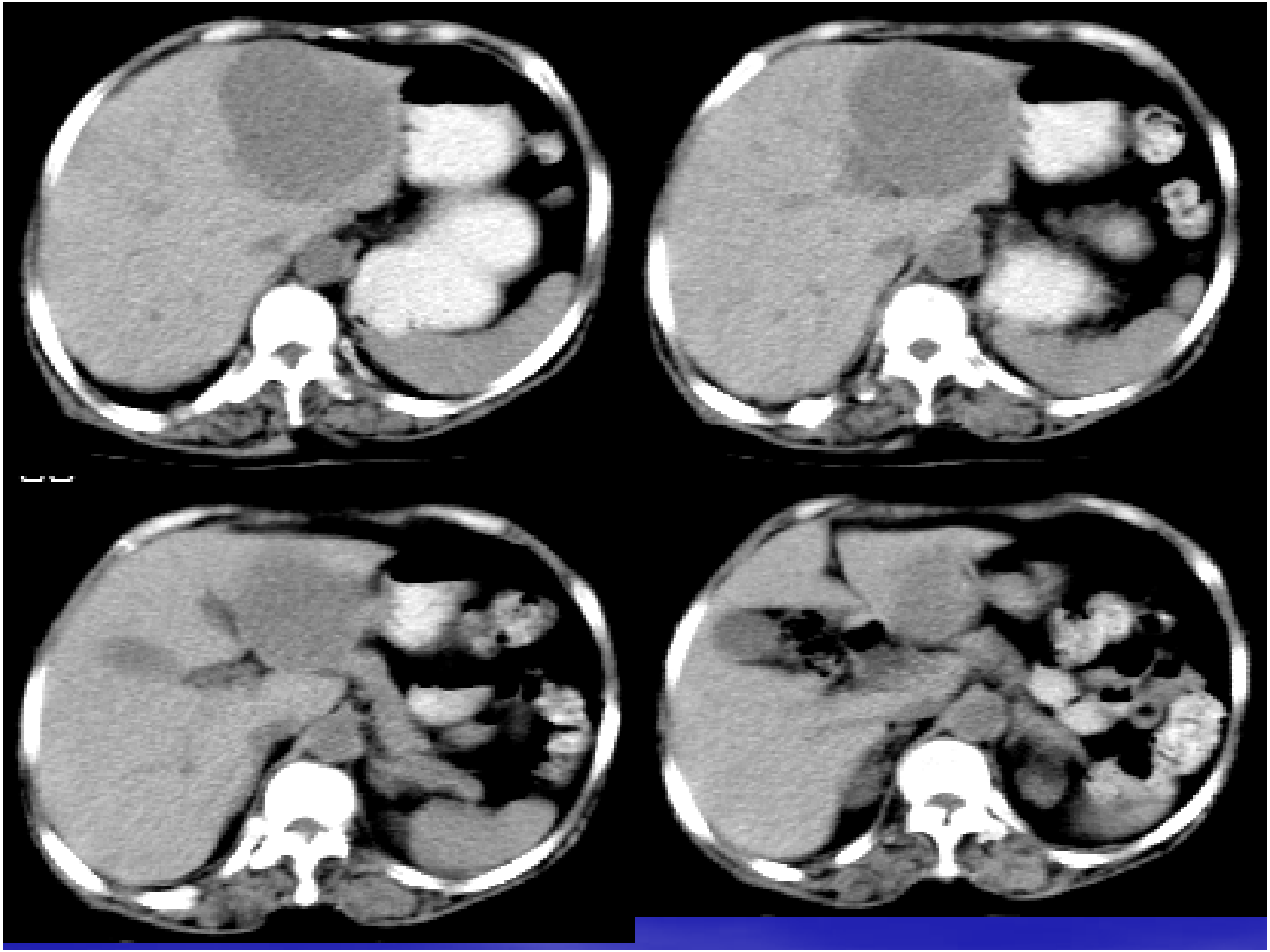
1、**rapidly enhance**

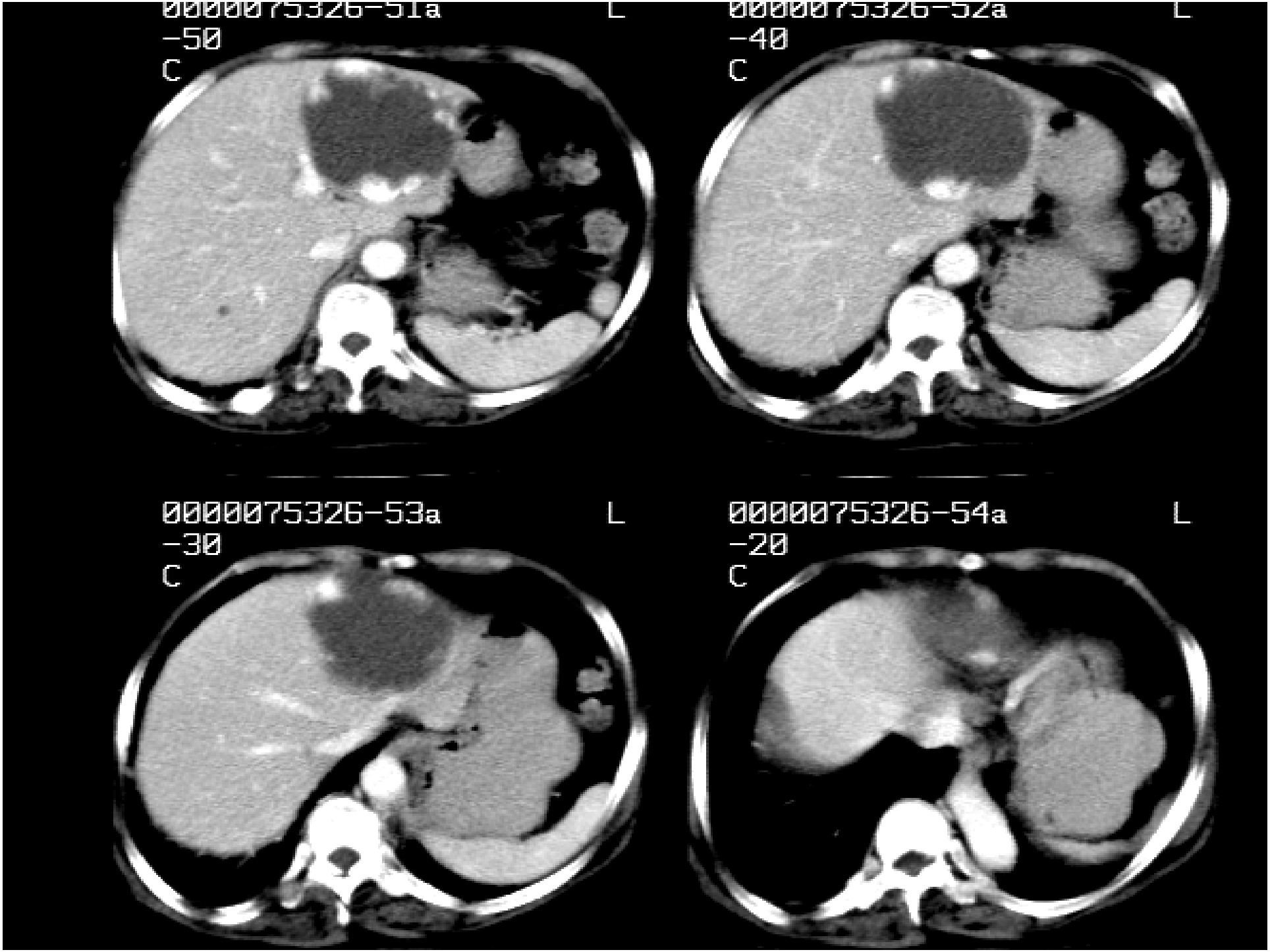
2、filling in centripetally to become isodensity with the adjacent parenchyma

3、The time for complete in-filling has been：

>3’、usually 7～15’、most long 20～60’


Plain scan
Arterial phase
Portal phase
Delayed phase

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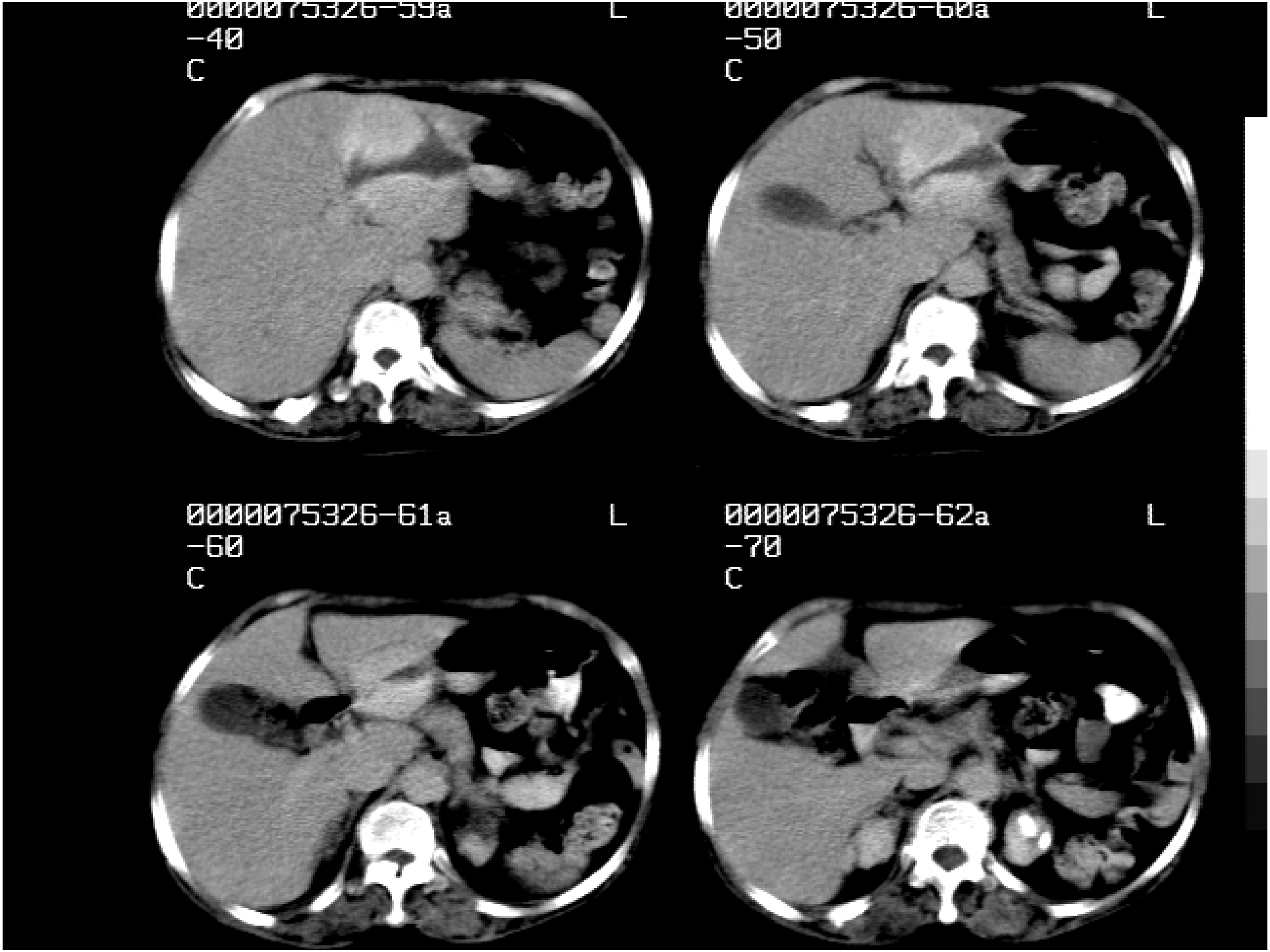
L
-20
C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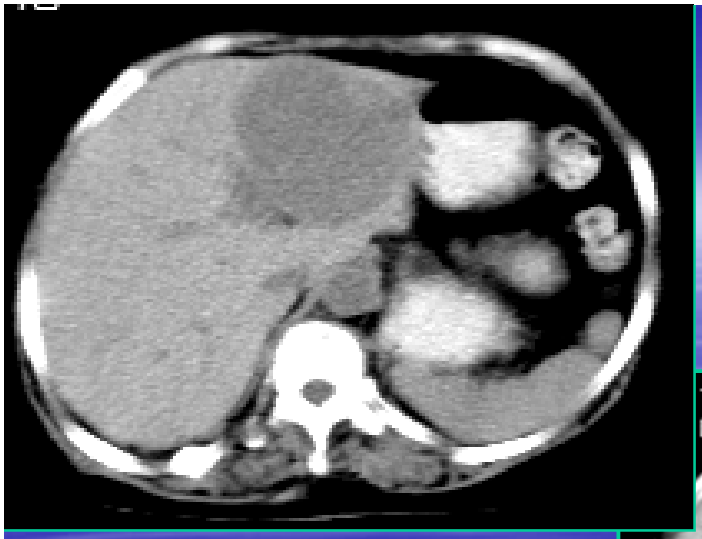
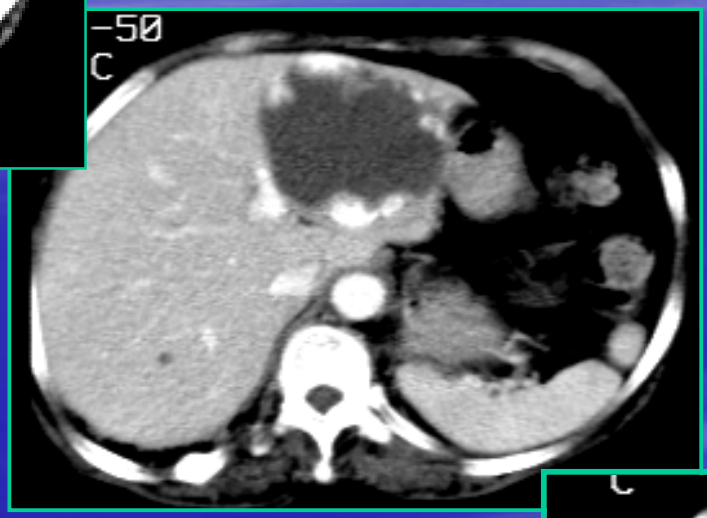


Plain Scan

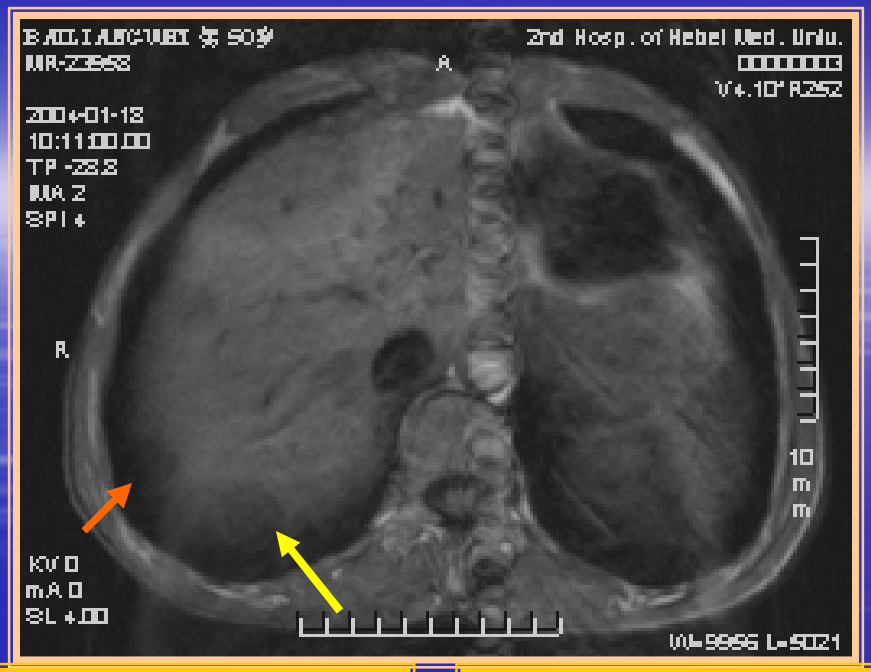


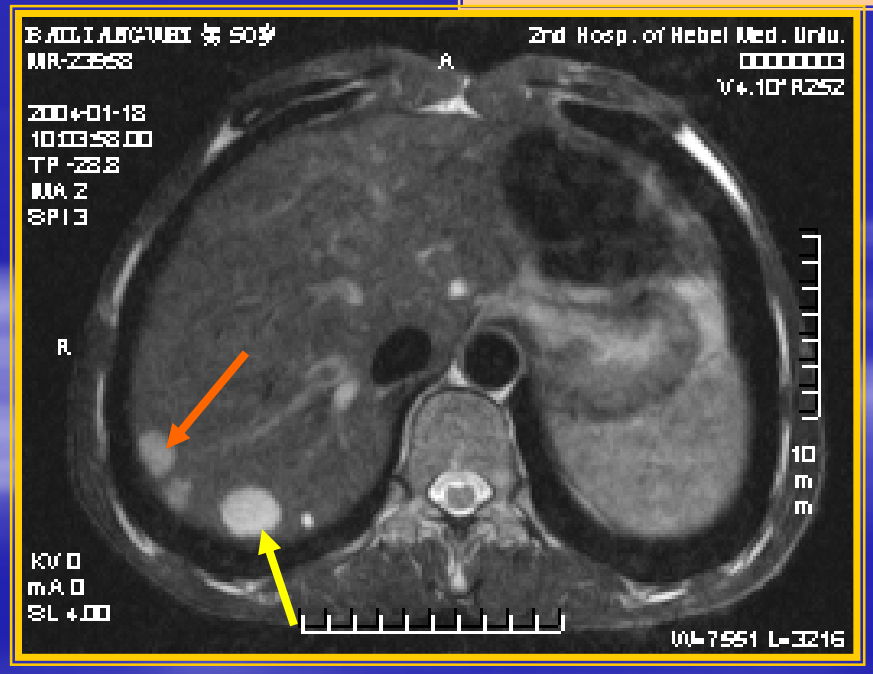
Enhancement

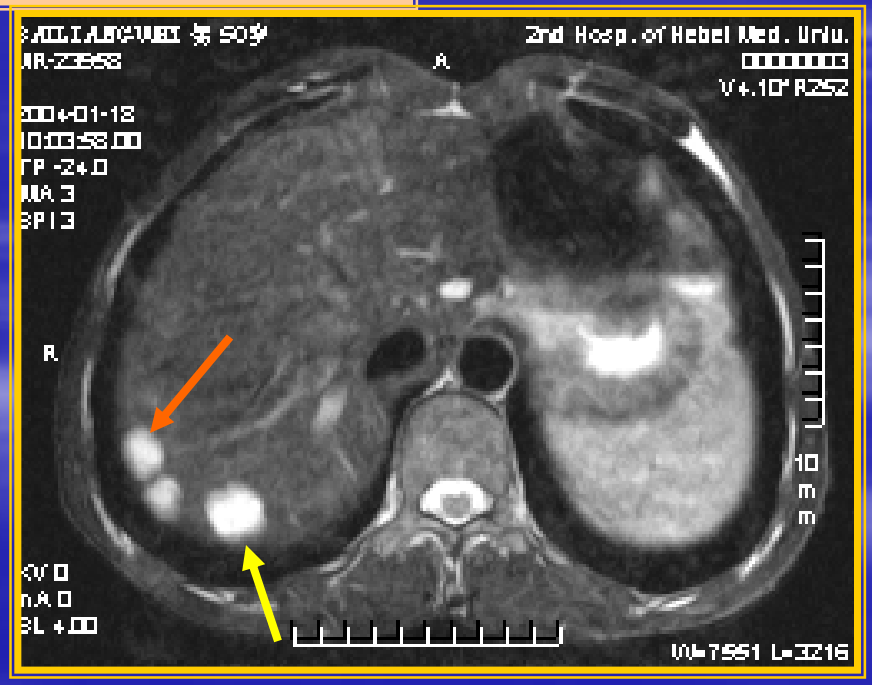
Delayed scan

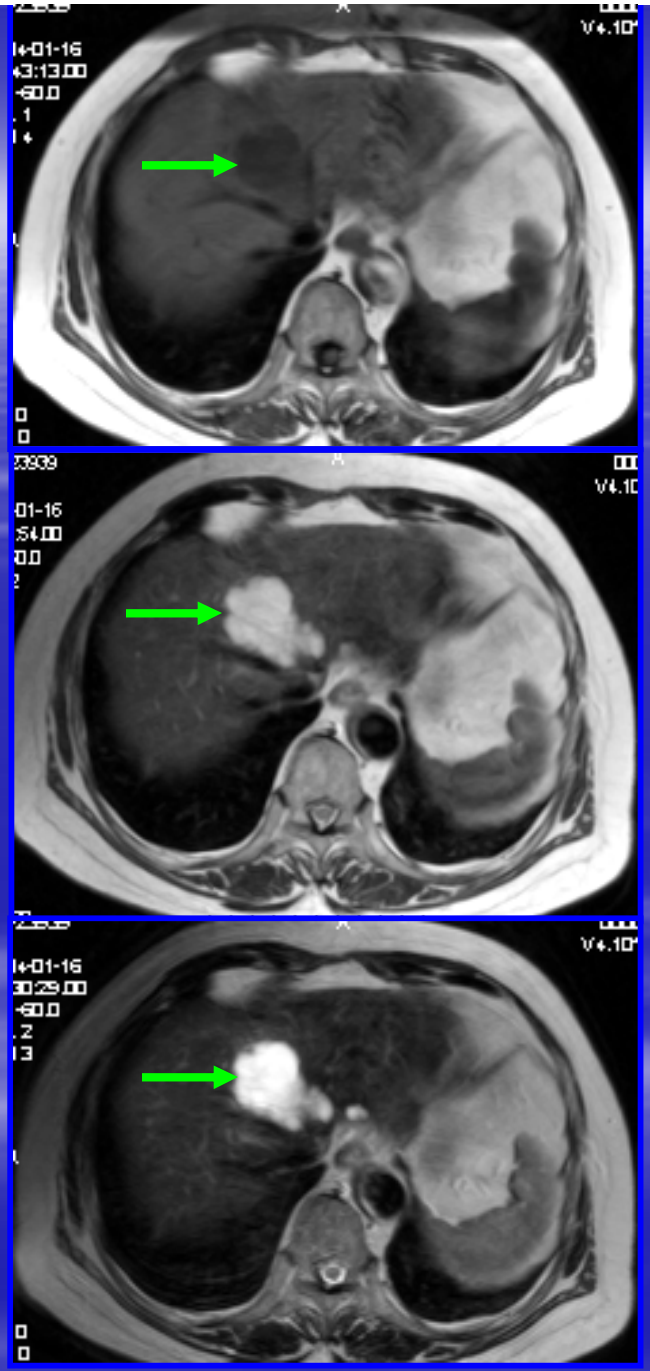
MRI appearance

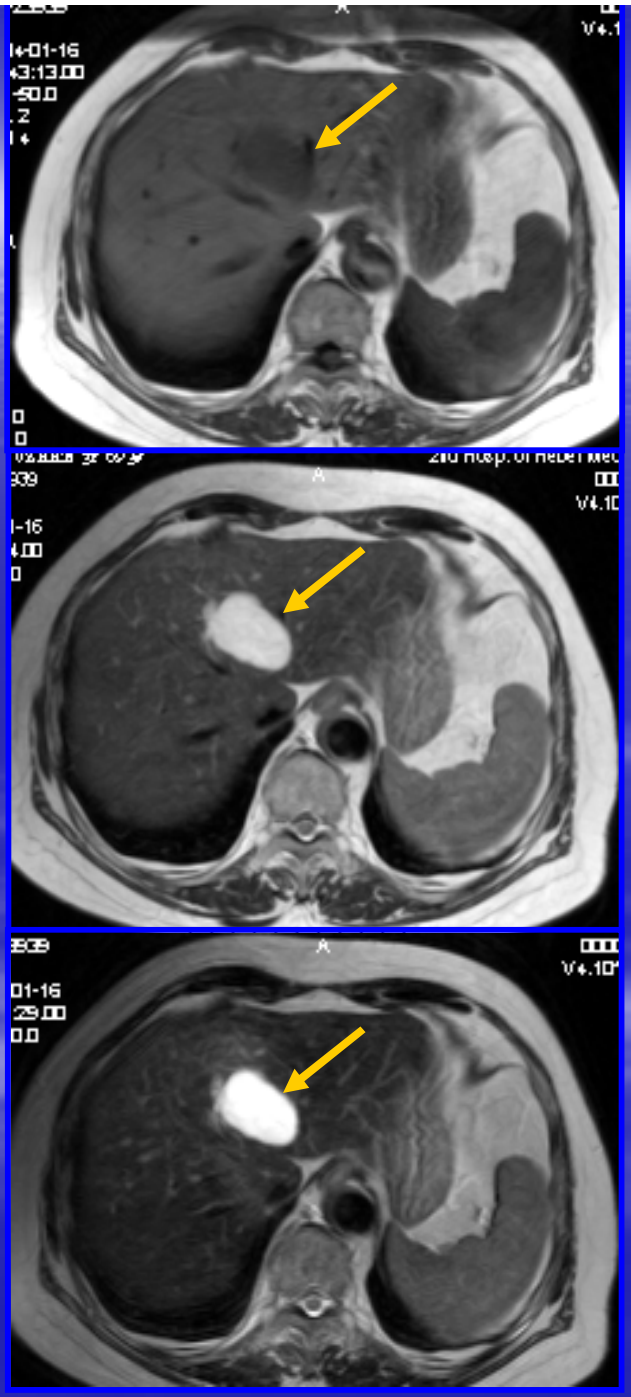
1. Round, Clear margin
2. Intensity—Hypointense on T1WI、Hyperintense on T2WI, longTE（≥120ms）long T2 value "lamp bulb",homogeneously Inhomogeneous caused by thrombosis and scar in the center
3. Enhancement scanning


2nd Hosp. of Hebei Med. Univ.
A
R
10 mm

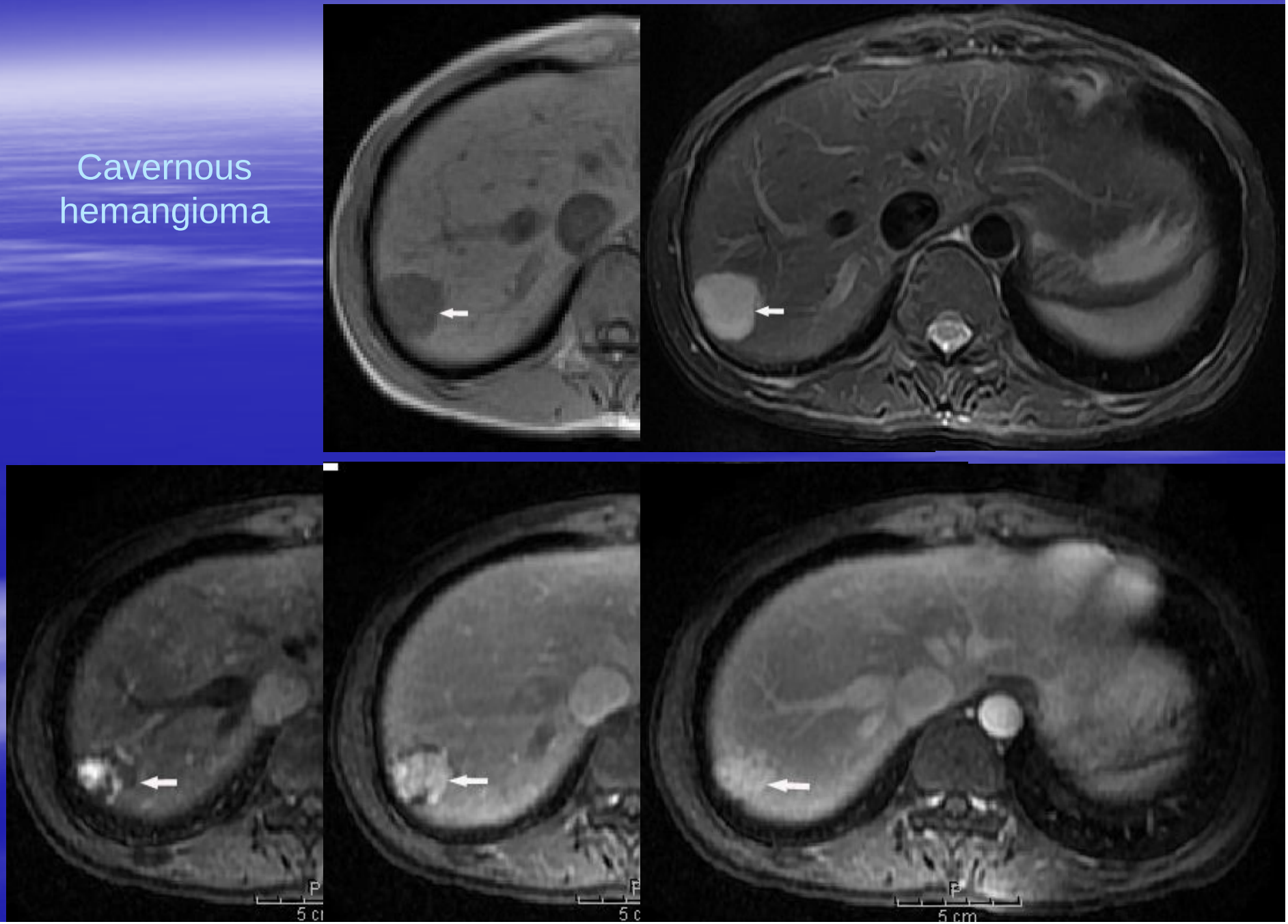

2nd Hosp. of Hebei Med. Univ.
A
R
10 mm


2nd Hosp. of Hebei Med. Univ.
A
R
10 mm





Cavernous hemangioma



Hepatocellular carcinoma

- **Hepatocellular carcinoma** (HCC)
- Viral hepatitide infection (hepatitis B or C)
- Cirrhosis (alcoholism)

CT

On CT, HCC can have three distinct patterns of growth:

- Massive type---A single large tumor ⩾ 5cm
- Nodular type--- Multiple tumors<5cm
- Diffuse type ---Poorly defined tumor with an infiltrative growth pattern
- Small hepatocellular carcinoma<3cm

Key points

- The key characteristics on CT are hypervascularity in the arterial phase scans, washout or de-enhancement in the portal and delayed phase studies, a pseudocapsule and a mosaic pattern. Both calcifications and intralesional fat may be appreciated.

Important features that guide treatment include:

- size
- spread (stage)
- involvement of liver vessels and bile duct
- presence of a tumor capsule
- presence of extrahepatic metastases
- presence of daughter nodules
- vascularity of the tumor

CT appearance of HCC

Shape and margin

(1) Regular or irregular
(2) Clear margin—pseudo-capsule
(3) ill-defined margin—infiltrating growing

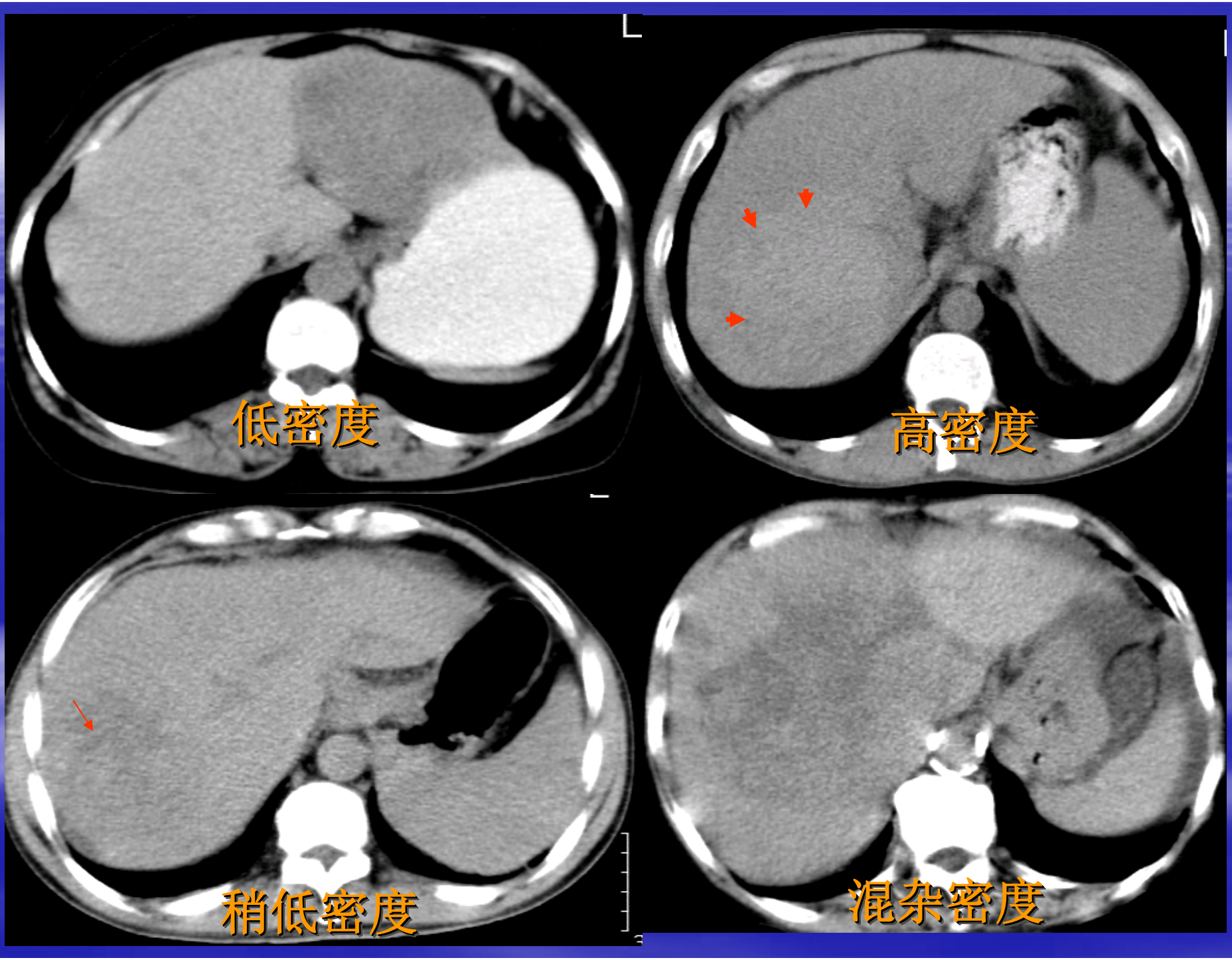
CT appearance of HCC

Density

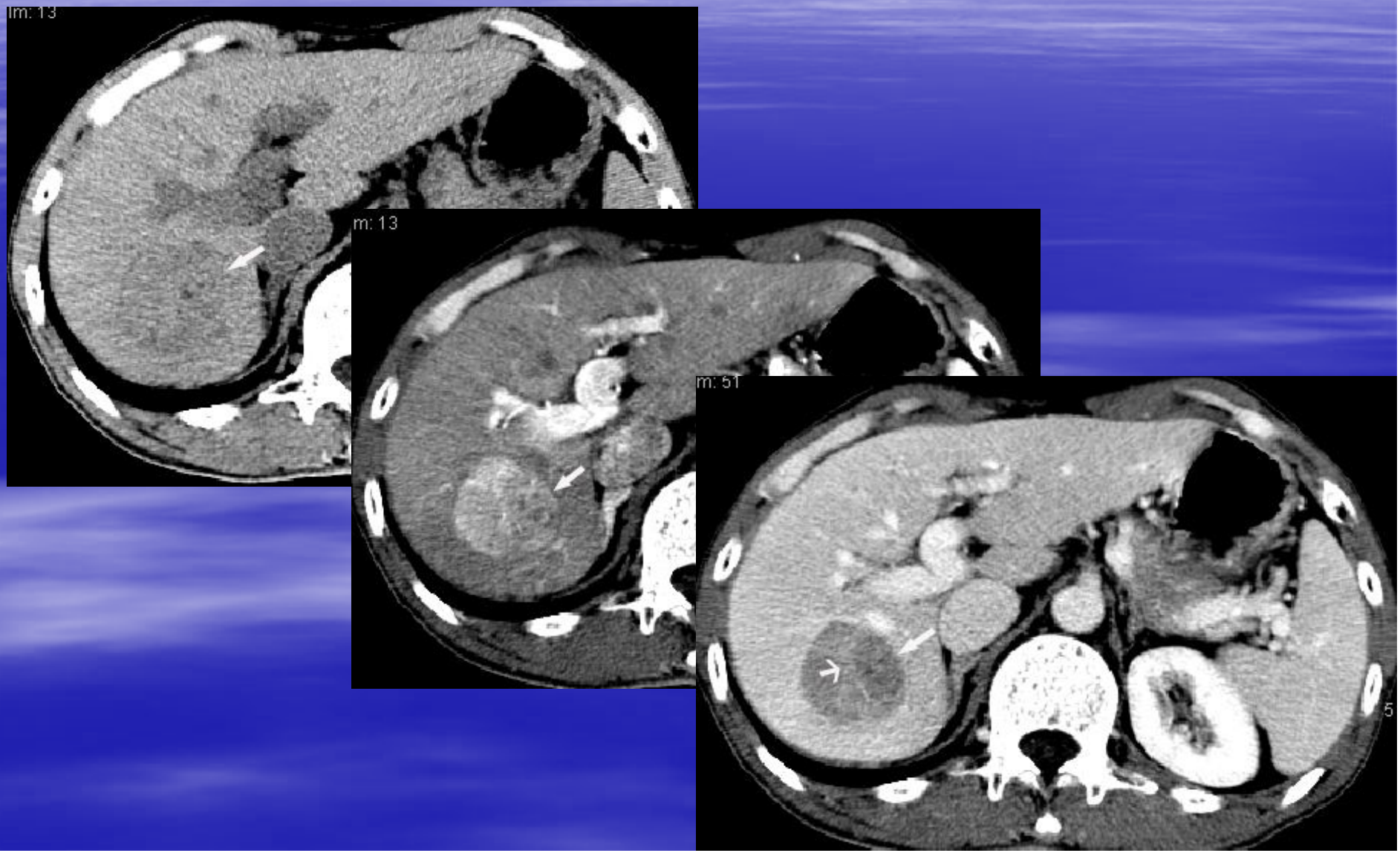
（1）hypodense（common）

（2）isodense or hyperdense（rare）

（3）mixed density（hemorrage, necrosis, calcification and fatty degeneration）


低密度
高密度
稍低密度
混杂密度

CT appearance of HCC



CT enhancement

Blood supply

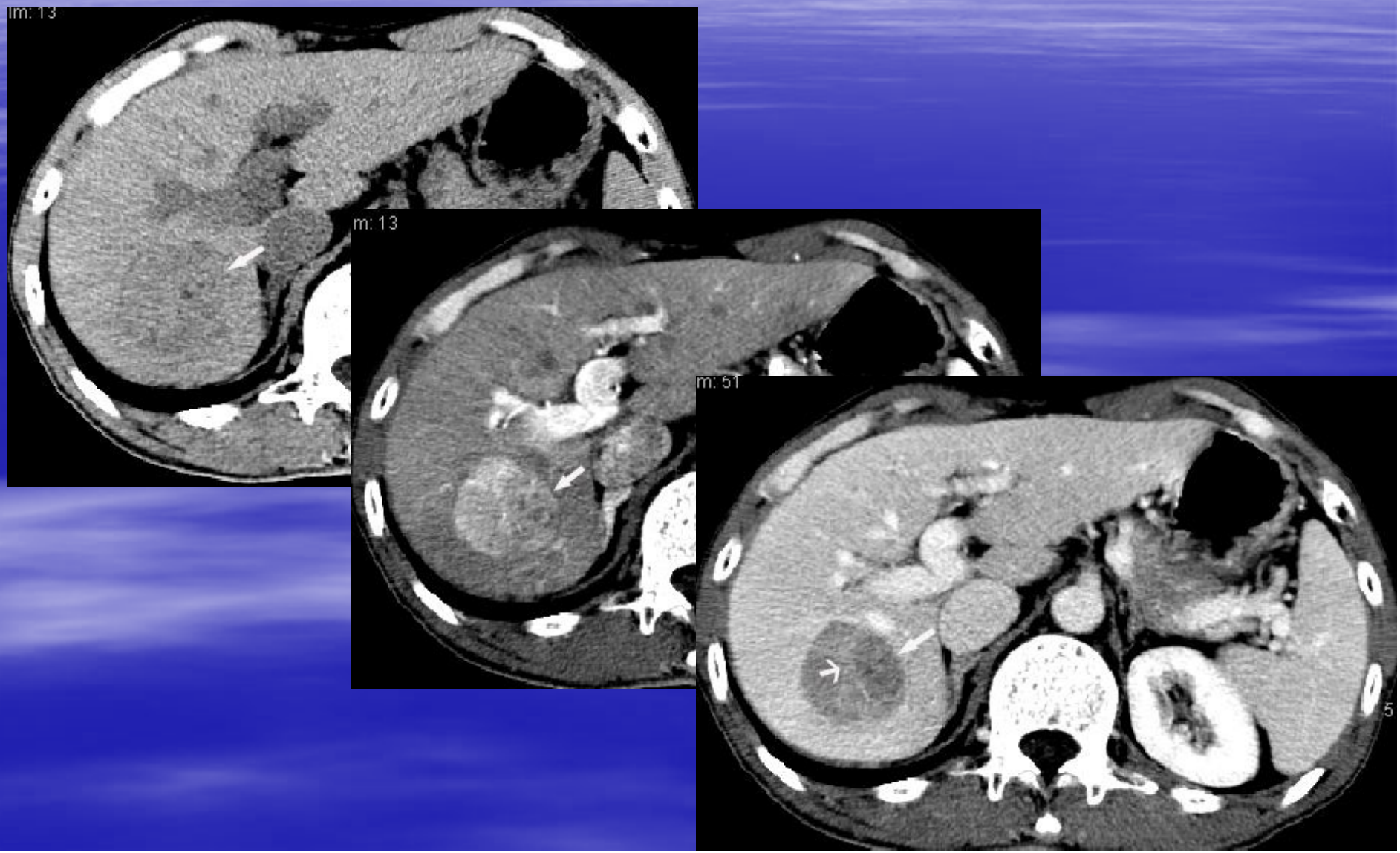
1）normal tissue: 25% from hepatic artery
75% from portal vein

2）HCC: 90% from hepatic artery
10% from portal vein

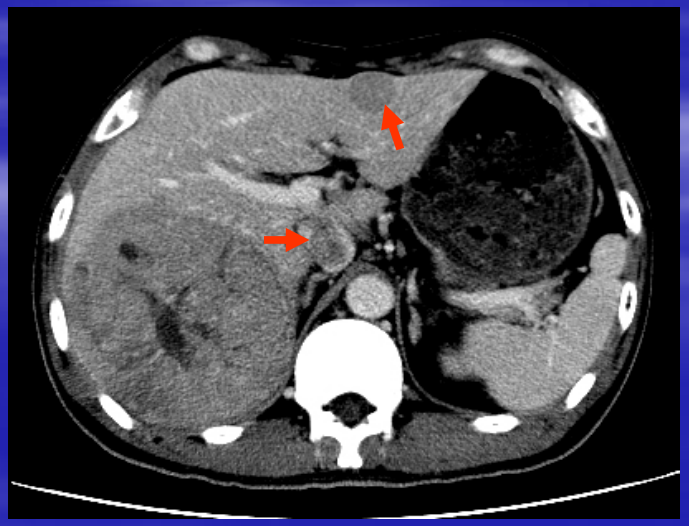
Enhancement

hypervascularity in the arterial phase scans, washout or de-enhancement in the portal and delayed phase

CT appearance of HCC



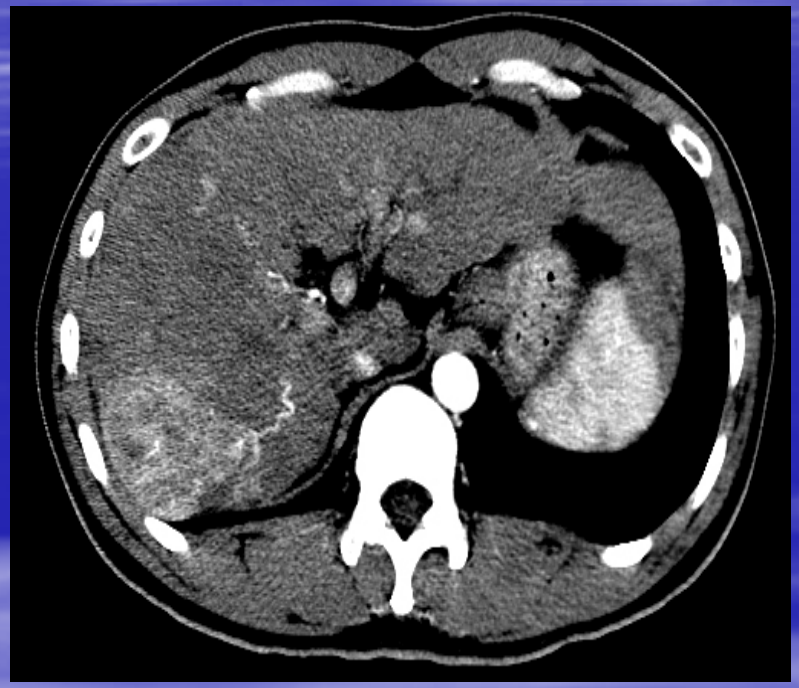
CT appearance of HCC

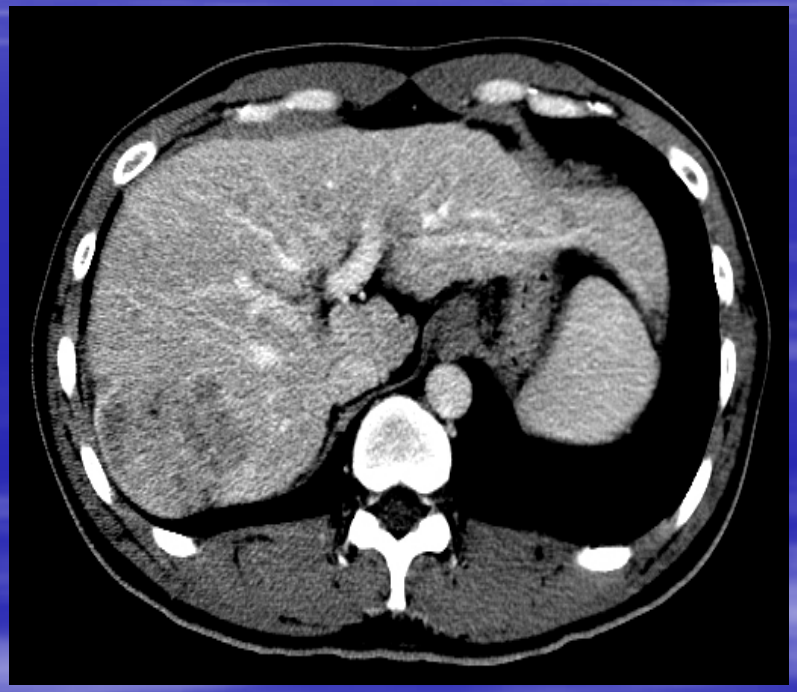


Massive type

巨块型肝癌、肝内子灶、IVC癌栓

CT appearance of HCC

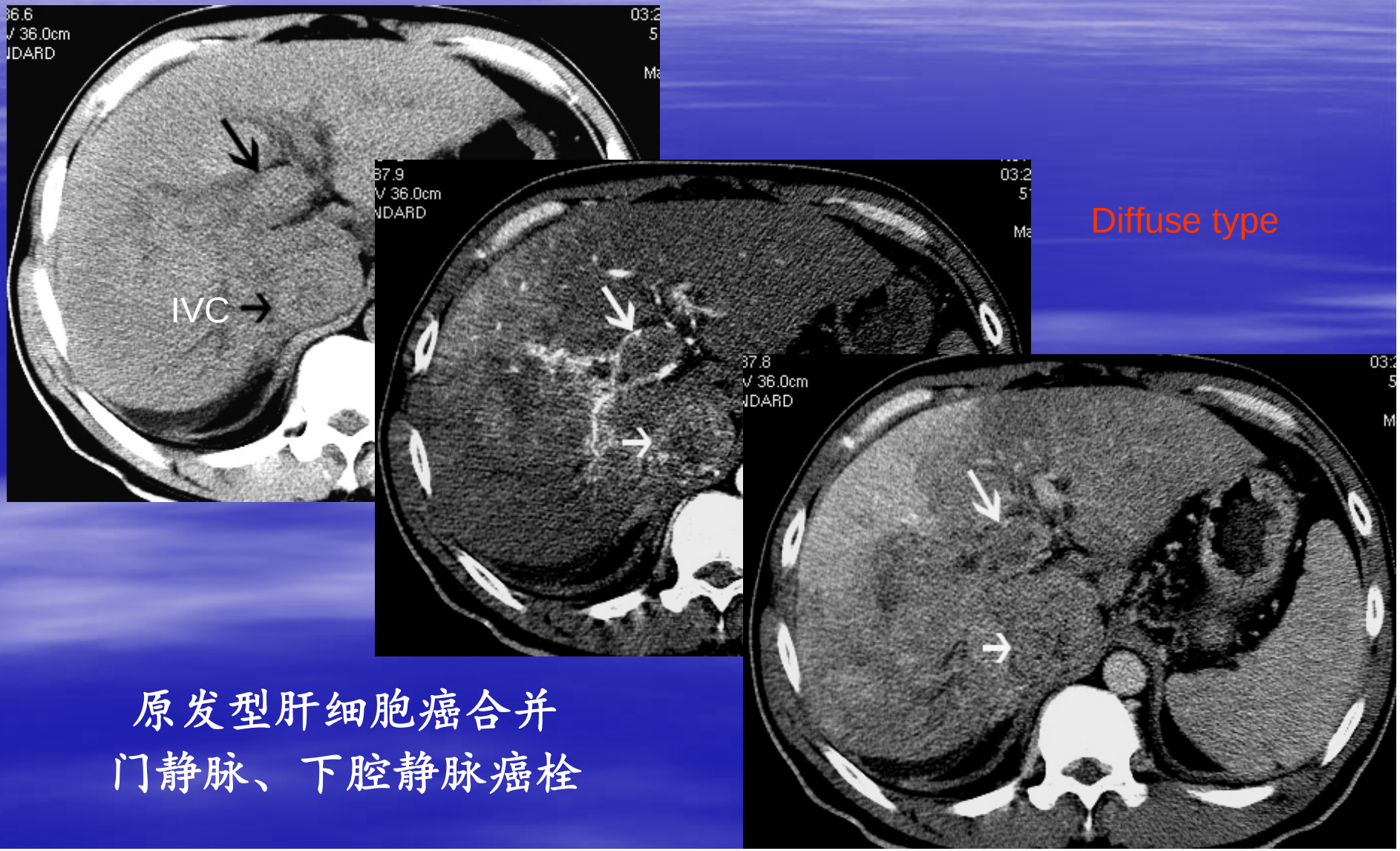




肝硬化合并原发性结节型肝癌

nodular type

CT appearance of HCC

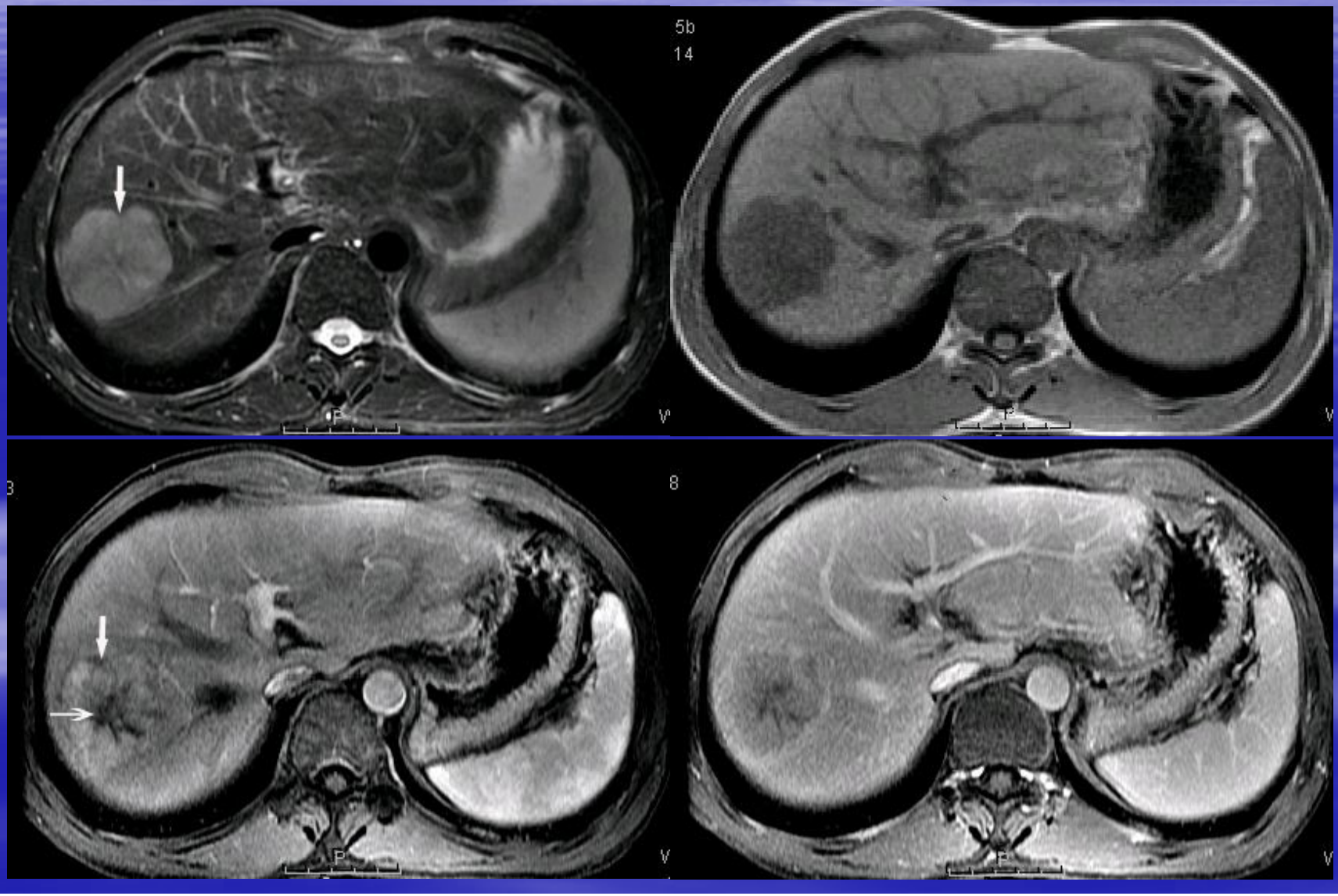


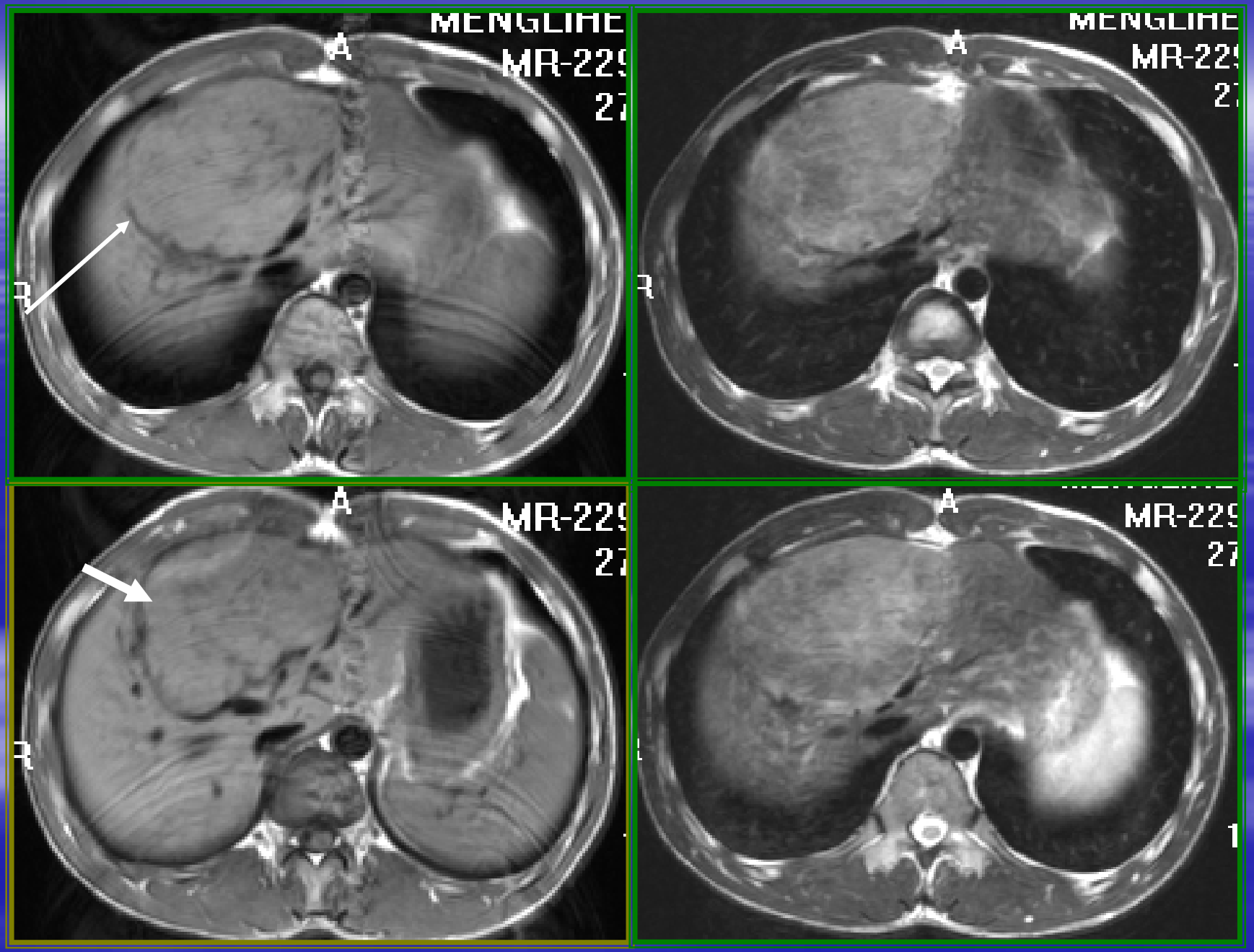
原发型肝细胞癌合并
门静脉、下腔静脉癌栓

MR appearance of HCC

- Low signal intensity on T1WI and high intensity on T2WI
- Low signal capsule on T1WI

MR appearance of HCC

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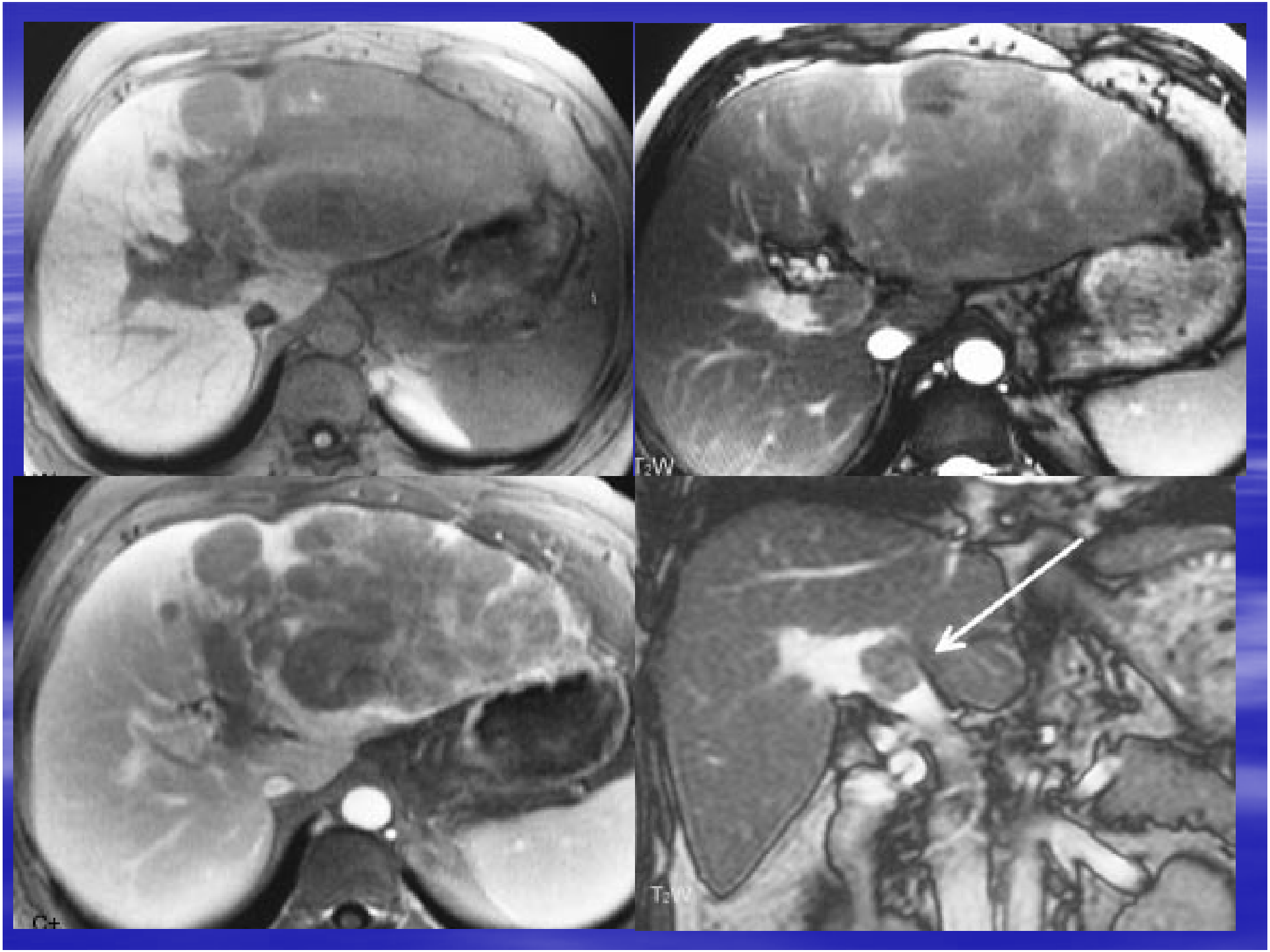
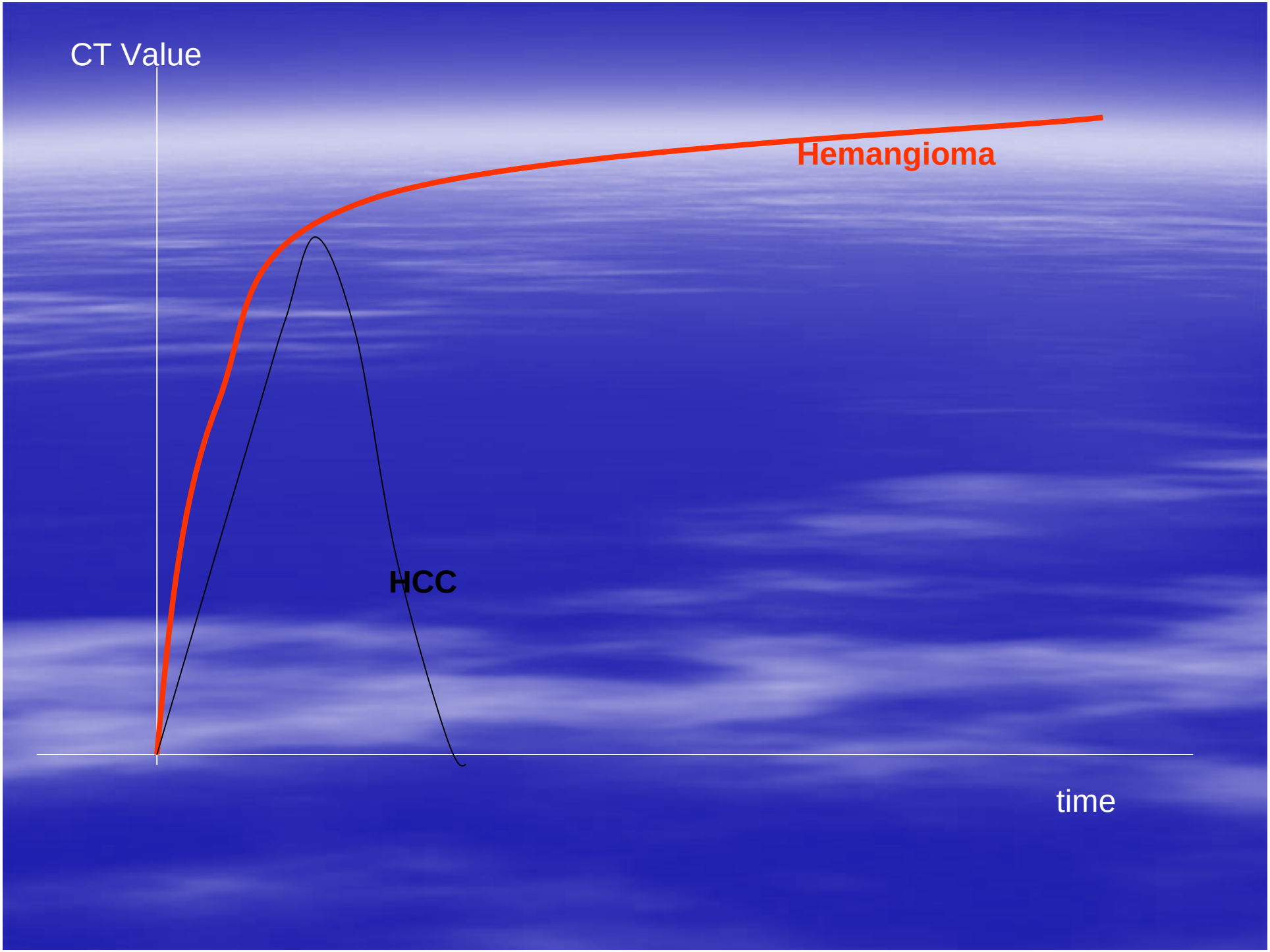
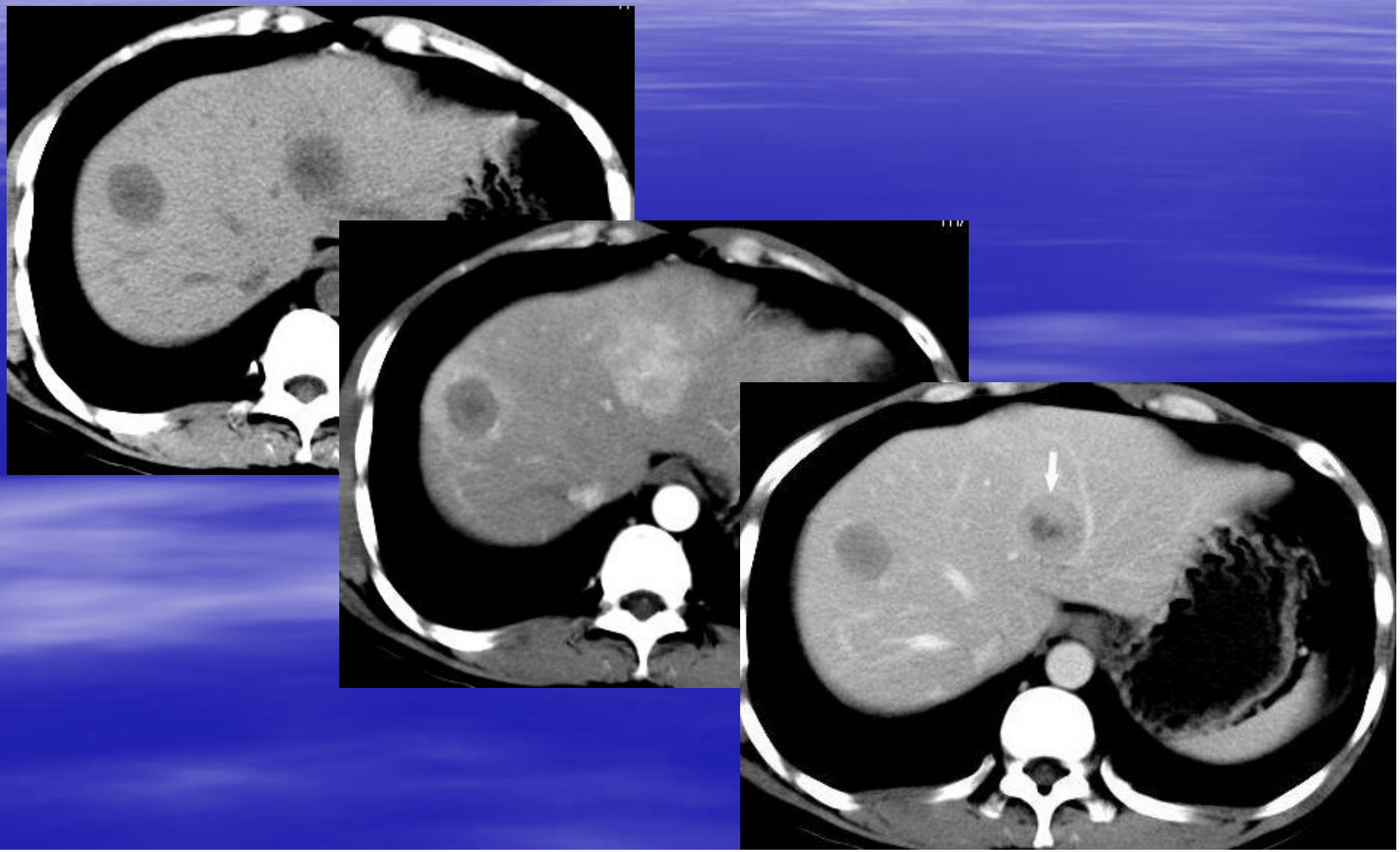

T2W
C+
T2W


CT Value
Hemangioma
HCC
time

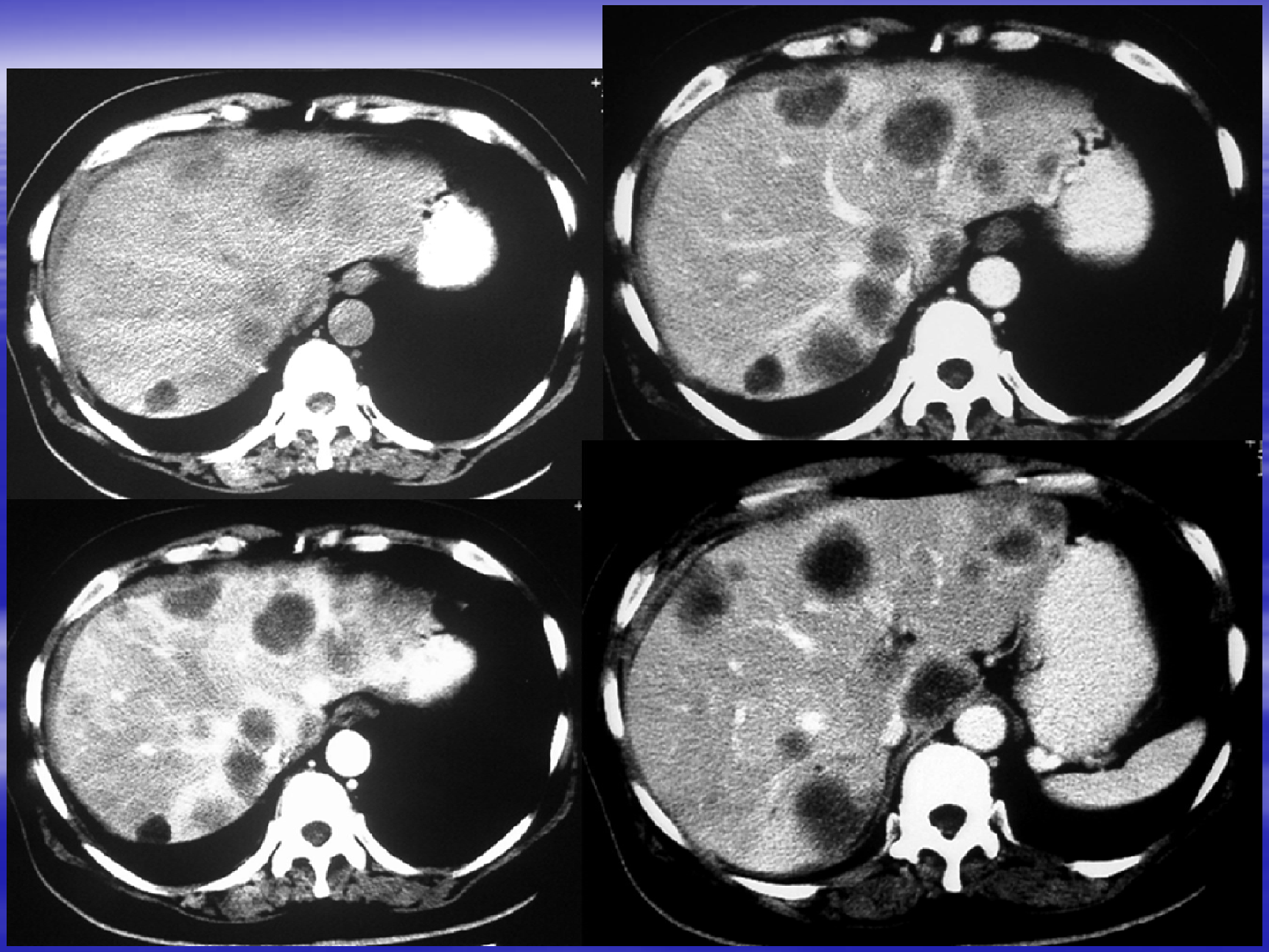
CT-Hepatic metastasis

- Hypodense lesion, round, multiple
- Central necrosis and rim enhancement
- bull's-eye configuration

CT-Hepatic metastasis



CT-Hepatic metastasis



Cholelithiasis

- ***Cholesterol* stones, *Pigment stones*, *Mixed stones***
- **20～30% of gallstones are radio-opaque**

Cholelithiasis-radiologic findings

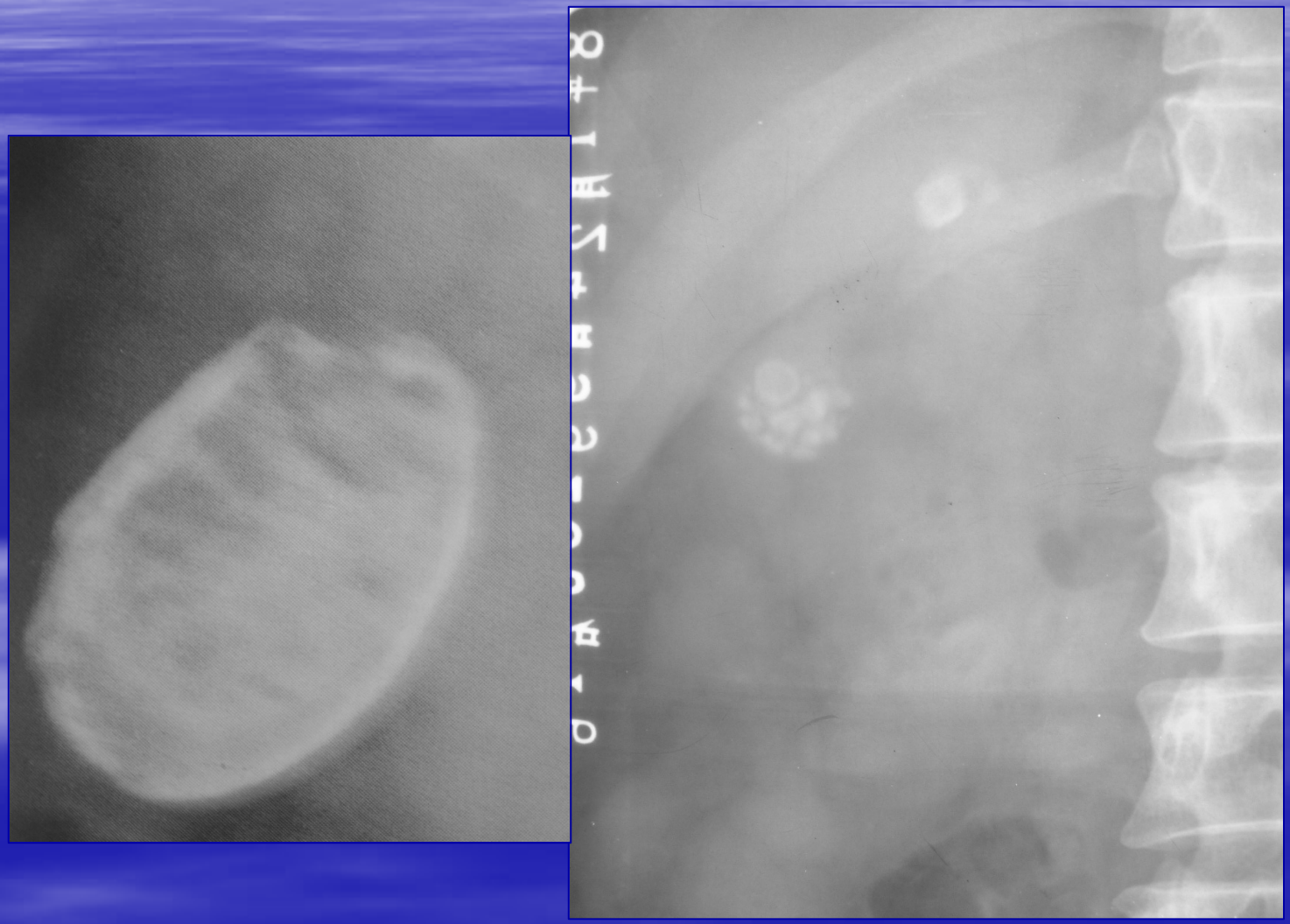
- X-ray: Radio-opaque stones, round or irregular
- Cholecystography: Filling defect
- CT: Ringlike calcification, CT value -60～140HU
- MR: Hypointense

------ Complicating with cholangiectasis and cholangitis

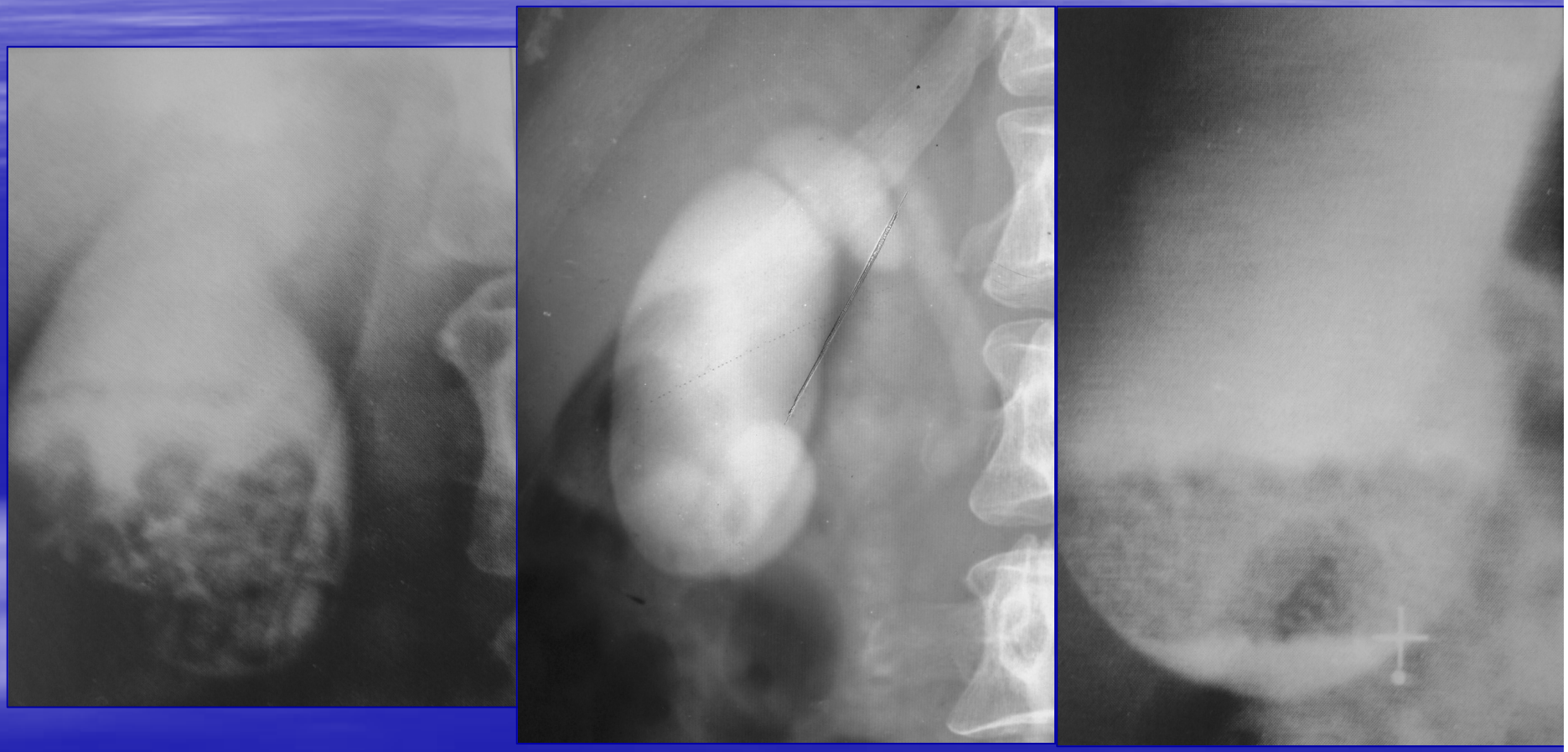
Cholelithiasis

平　片

Cholelithiasis

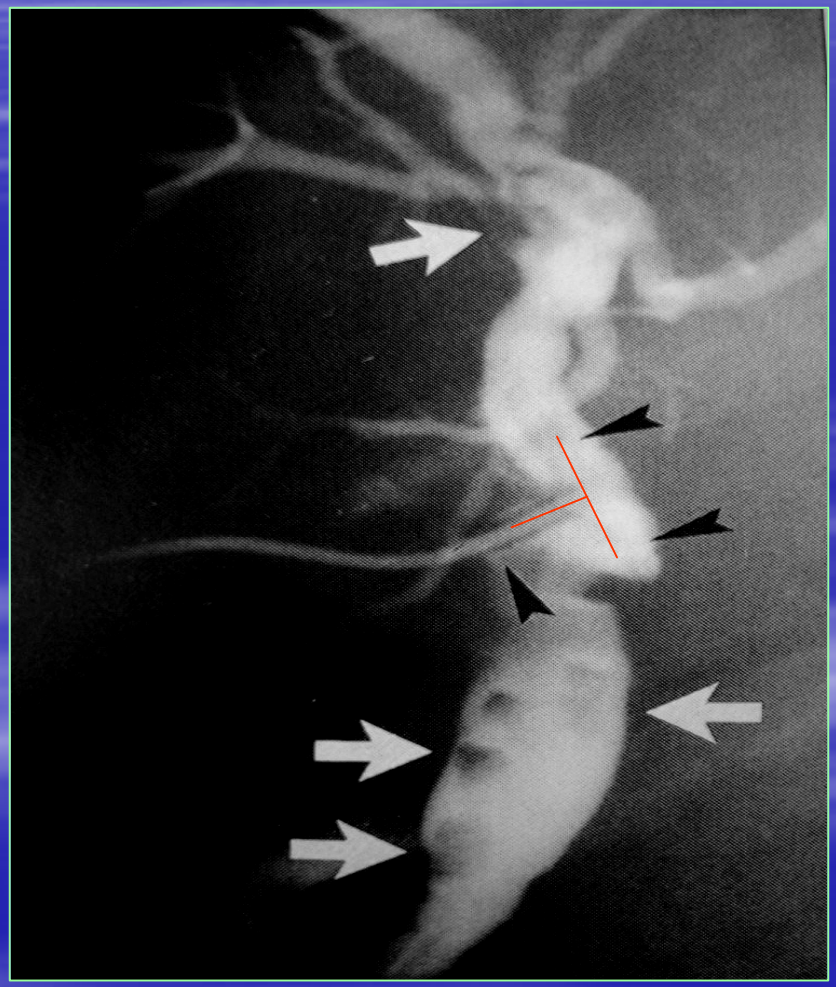


Cholelithiasis



Cholecystography----radioparent calculus

Cholelithiasis



T-tube
Cholangiography

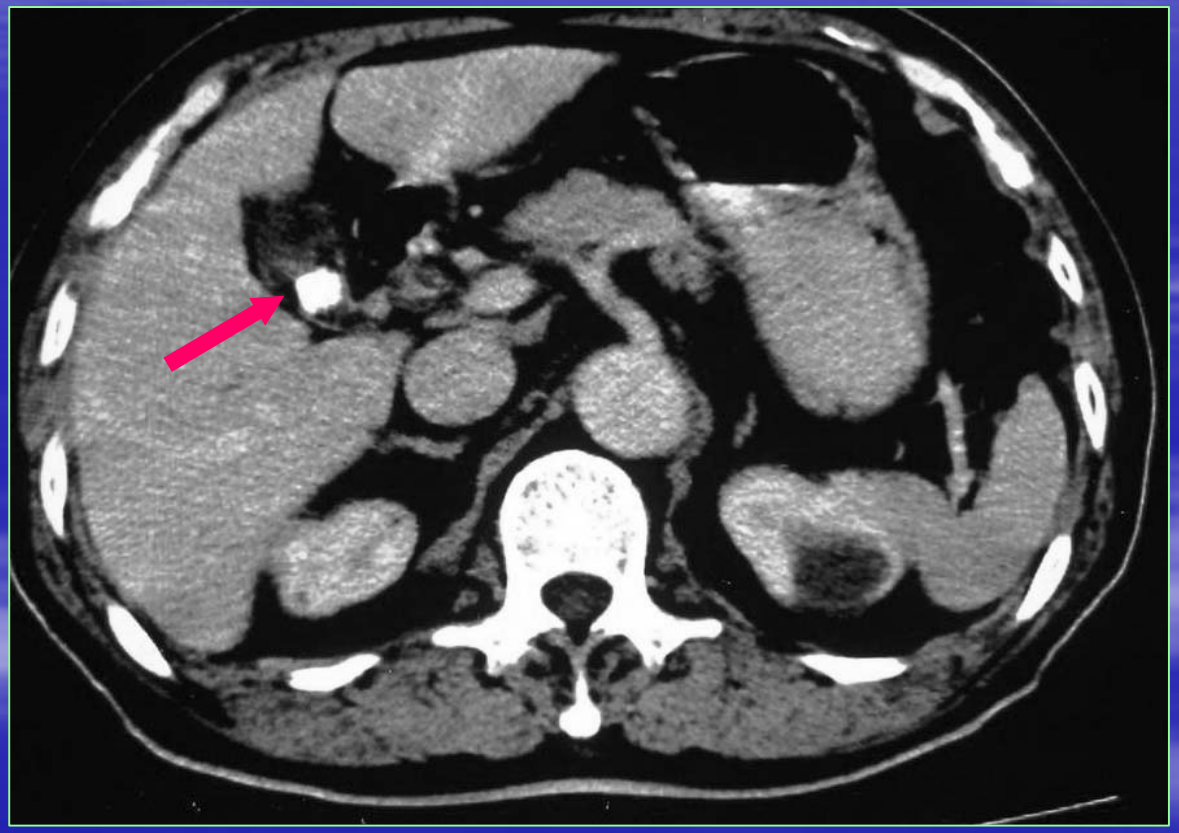
Cholelithiasis

PTC造影

Cholelithiasis

- CT

cholecystolithiasis

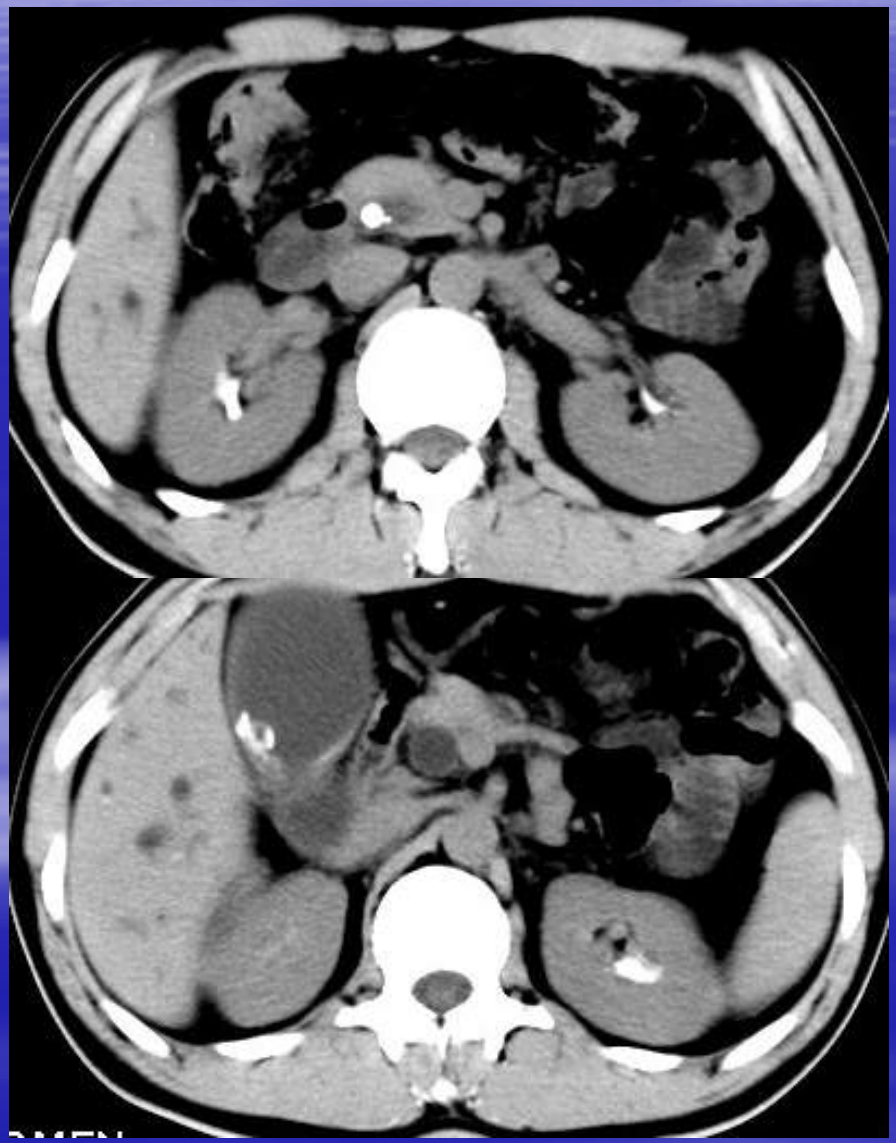


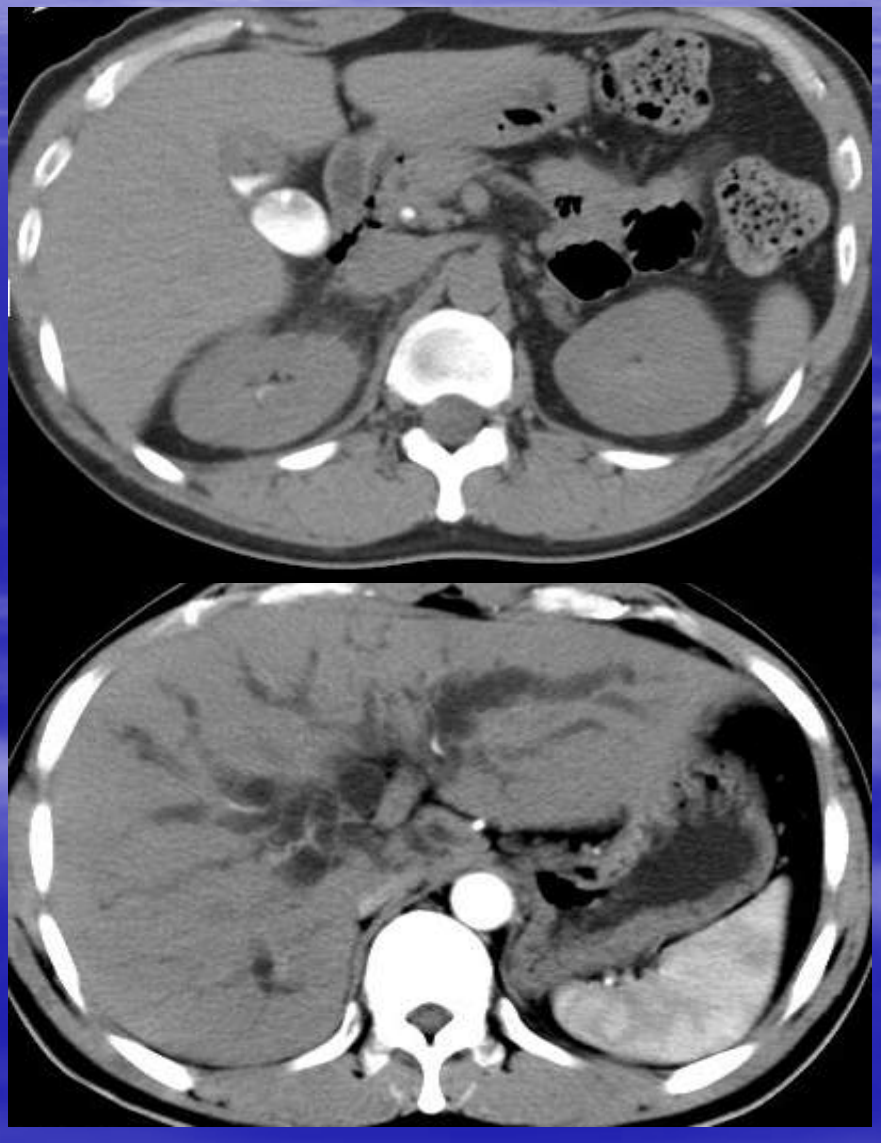
Cholelithiasis

CT检查

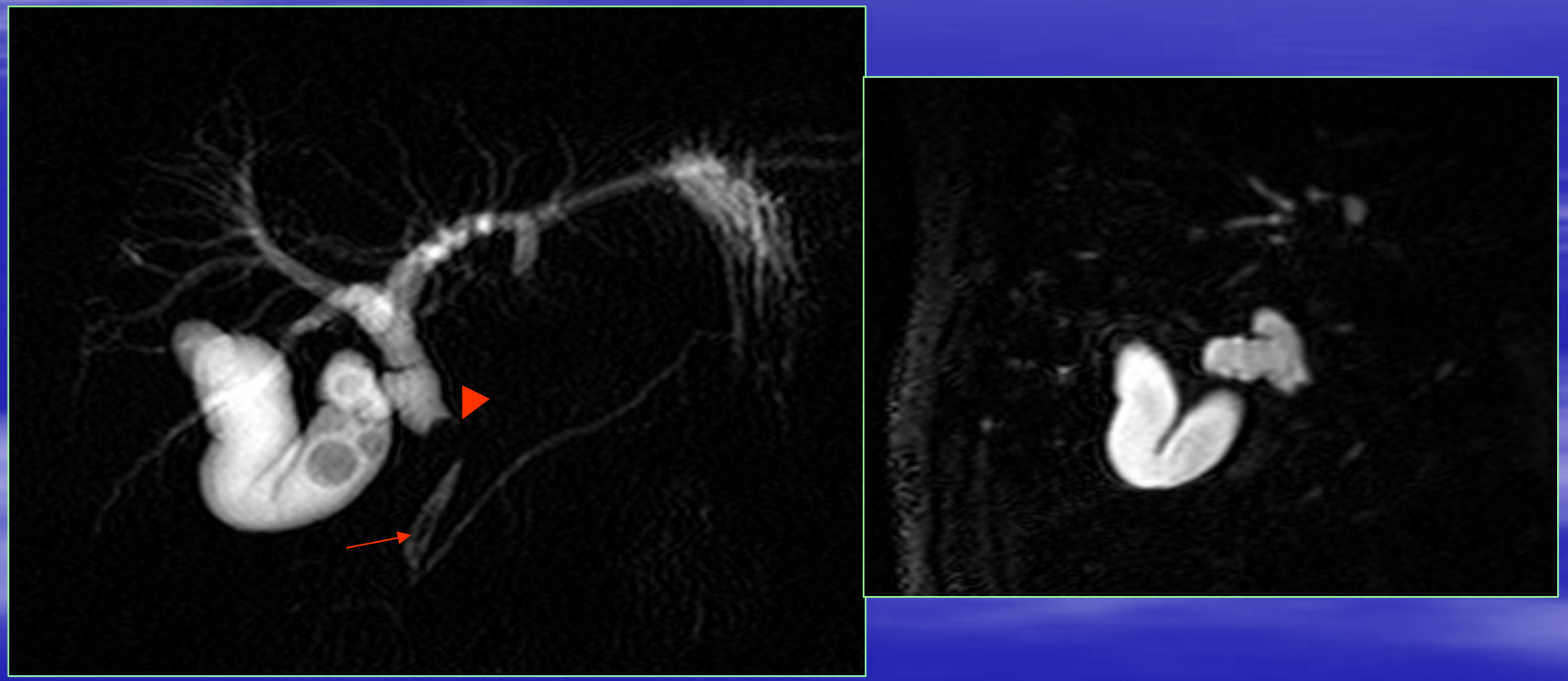
cholecystography

Cholelithiasis





Cholelithiasis

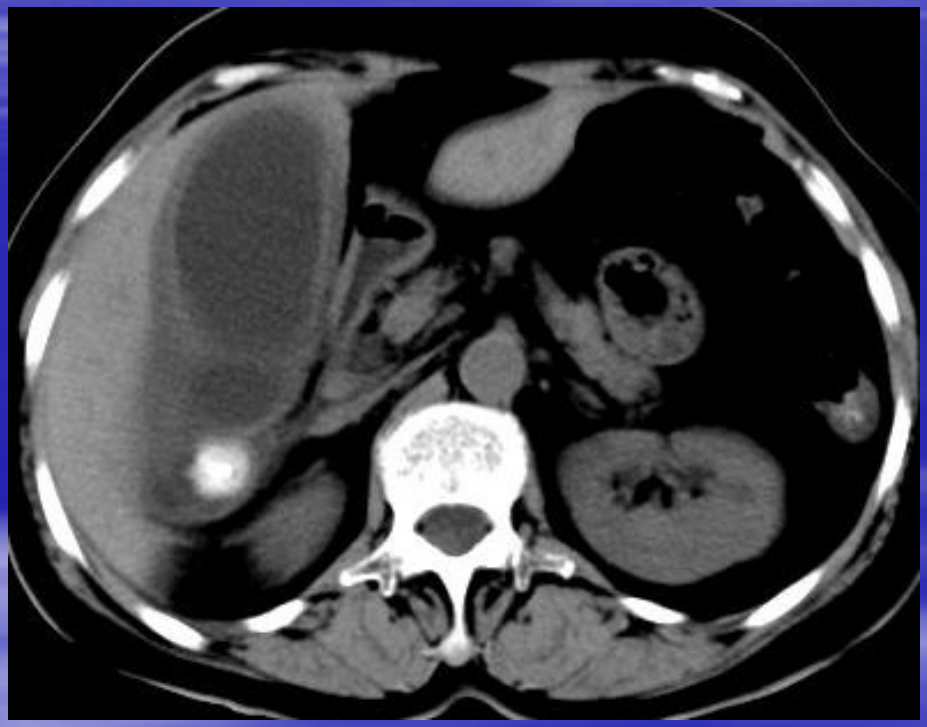


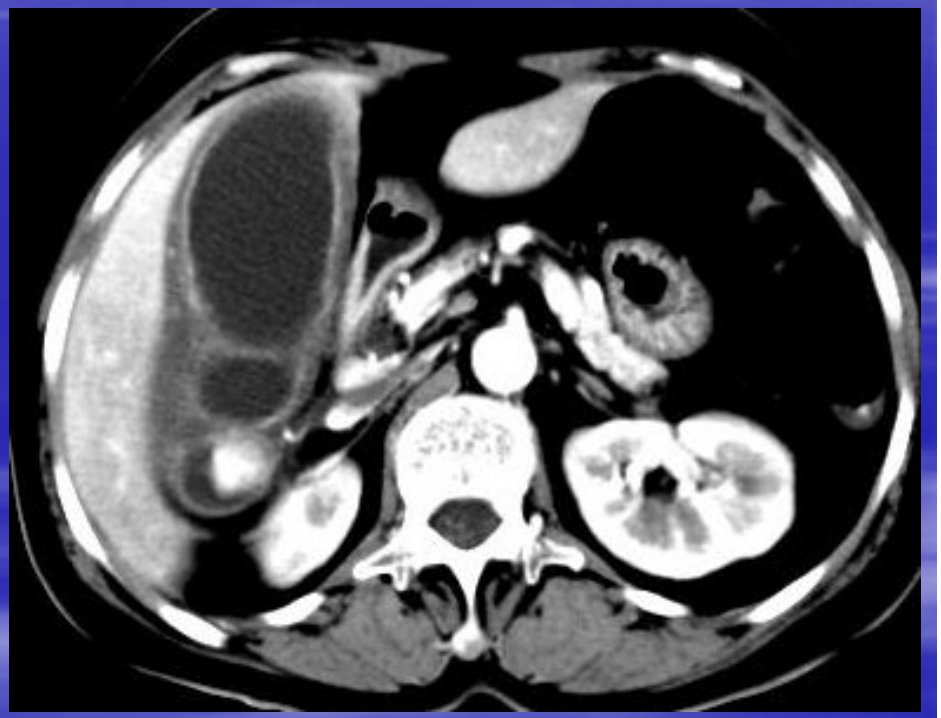
MRCP

Cholecystitis

- **Imaging findings:**
  - **CT:**
    - **Thickening of the wall>3mm**
    - **Acute stage: edema**
    - **Chronic stage: shrink,** calcification of the wall cholelithiasis

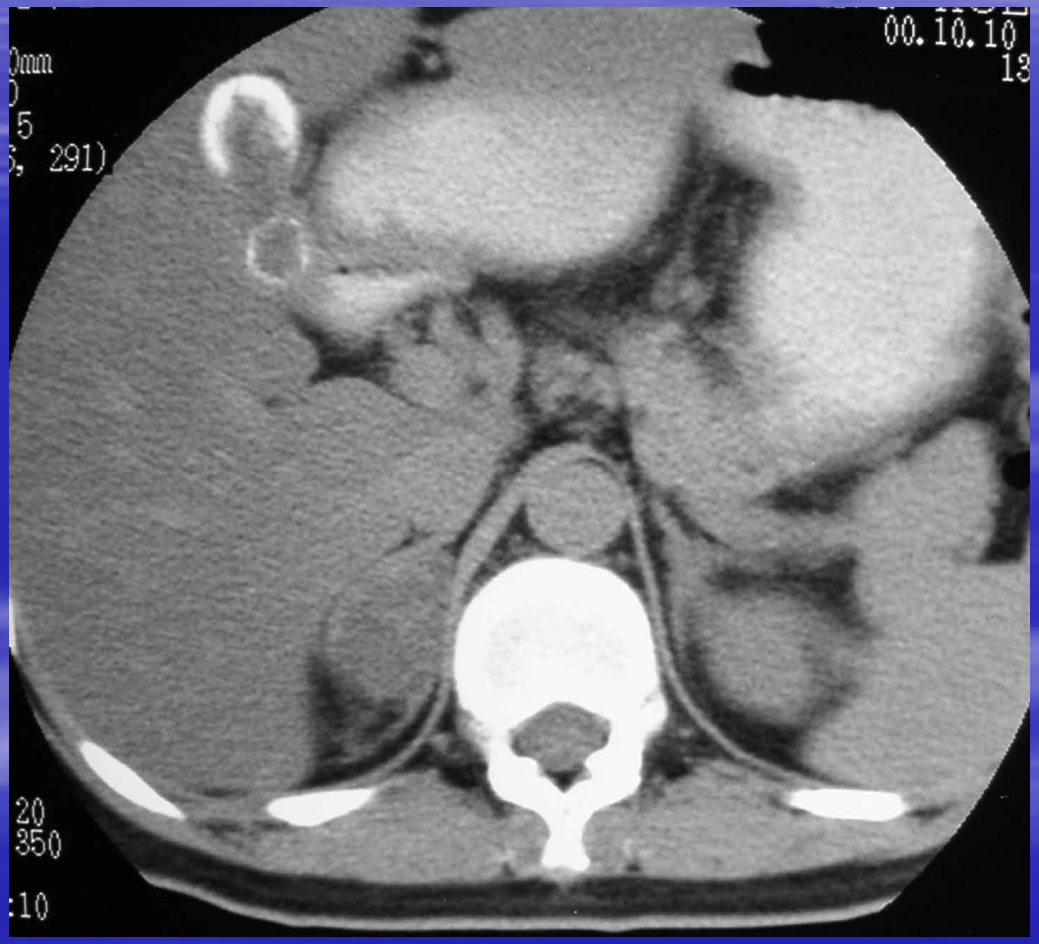
cholecystitis





Chronic cholecystitis : shrink of the gallbladder and thickening wall

Calcification



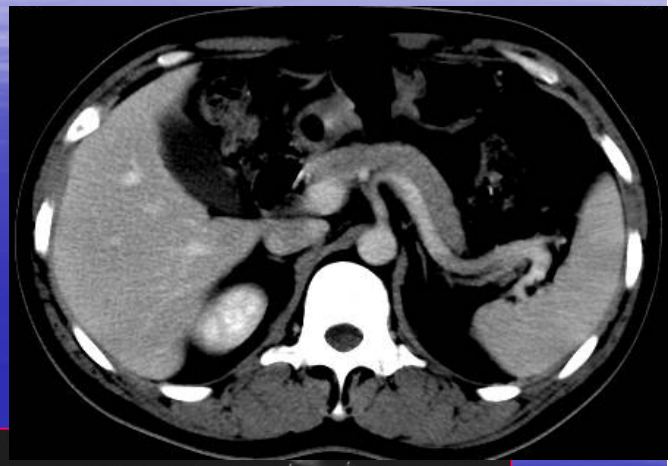
Pancreatitis

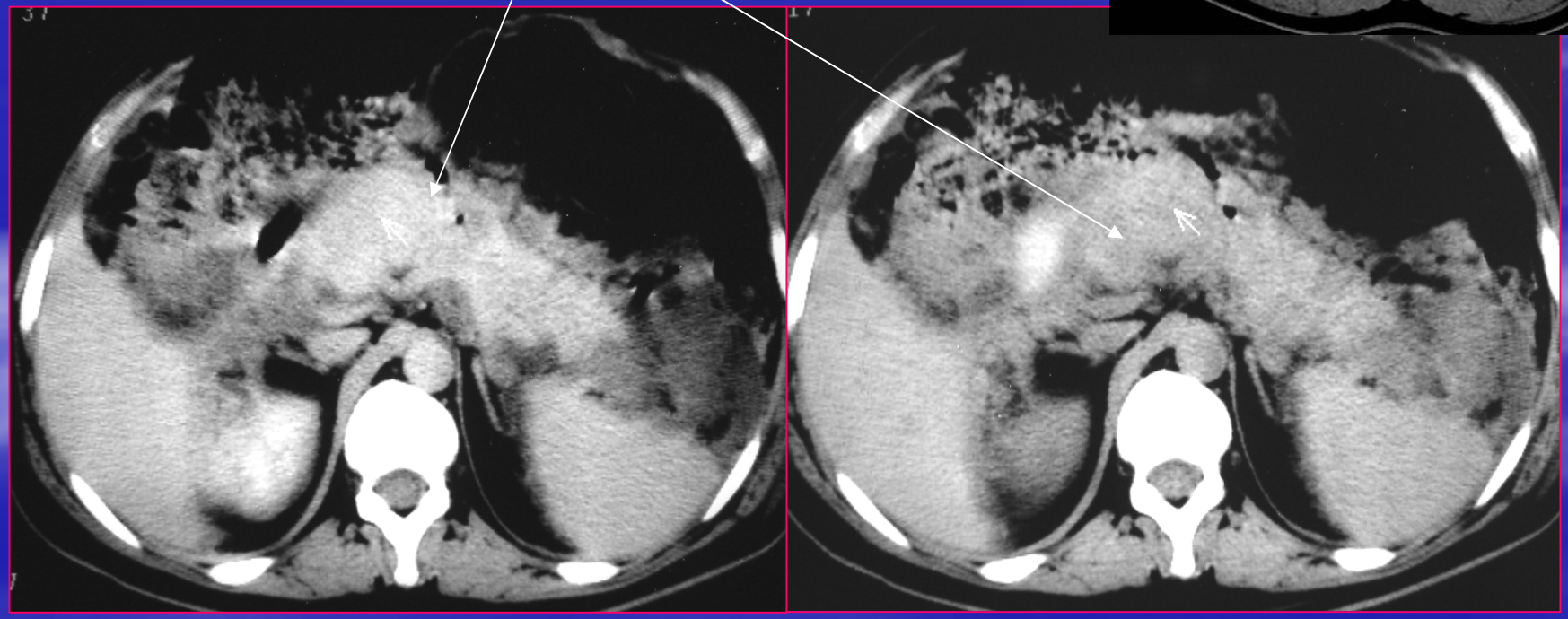
Acute pancreatitis

- Excessive swelling of the pancreas, surrounded by isodense or slightly hypodense exudative zones.
- Perirenal fasciae are visible and thickened
- Hemorrhagic and necrosis

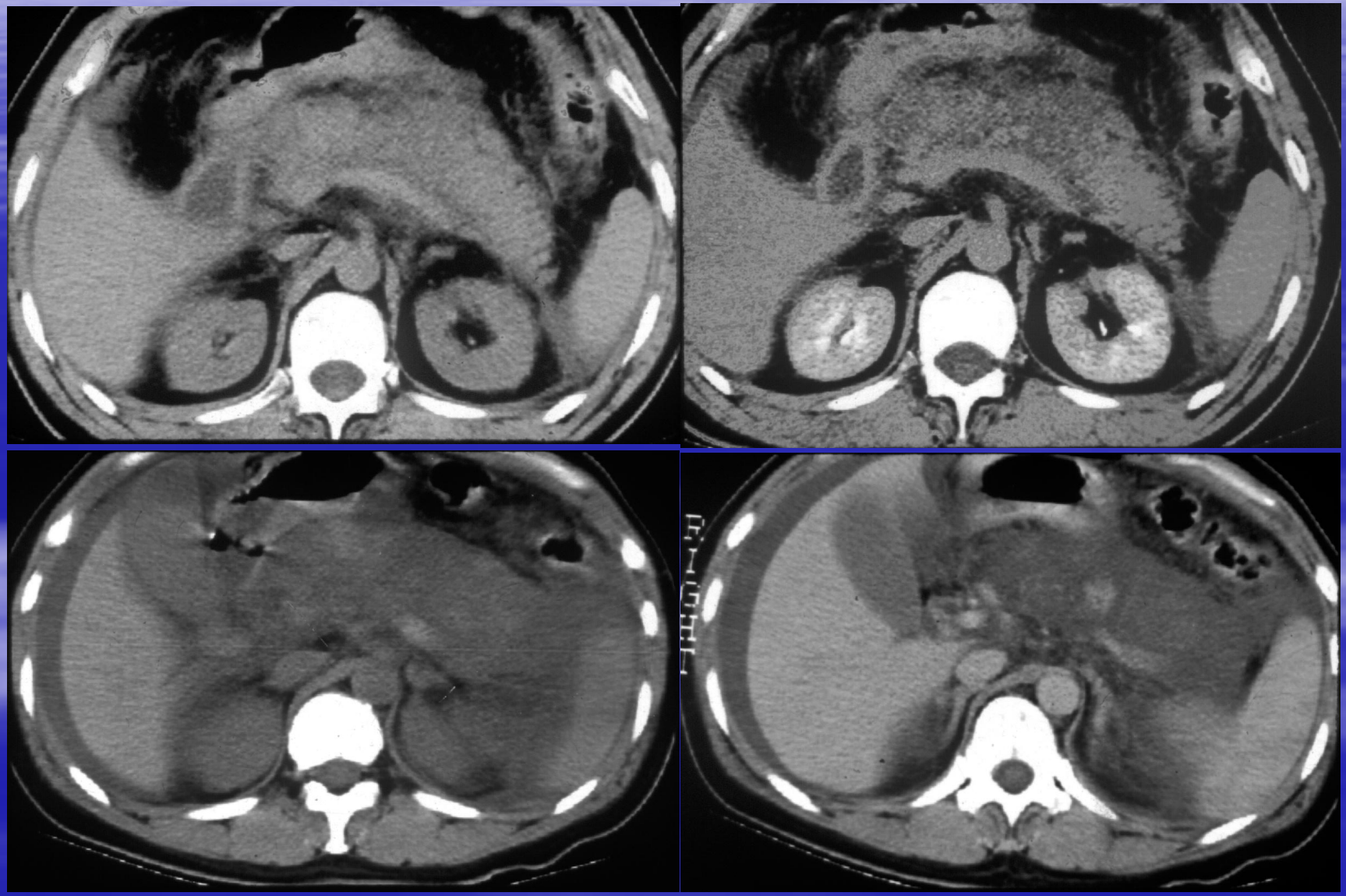
Acute pancreatitis

Excessive swelling of the pancreas





Acute pancreatitis

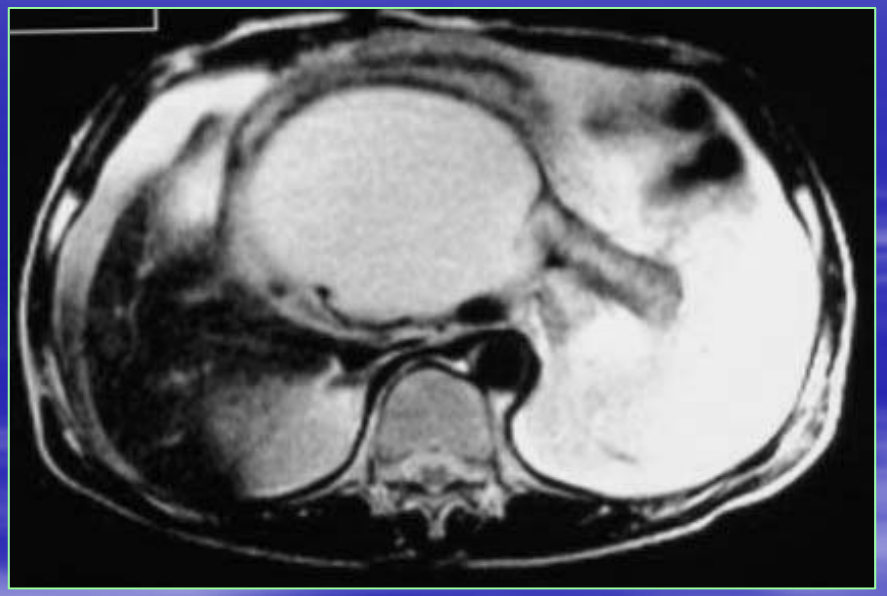


Acute pancreatitis

Chronic Pancreatitis

- Calcification
- Pancreatic atrophy or swelling
- Dilatation of the pancreatic duct
- Pseudocysts 30%

Chronic Pancreatitis

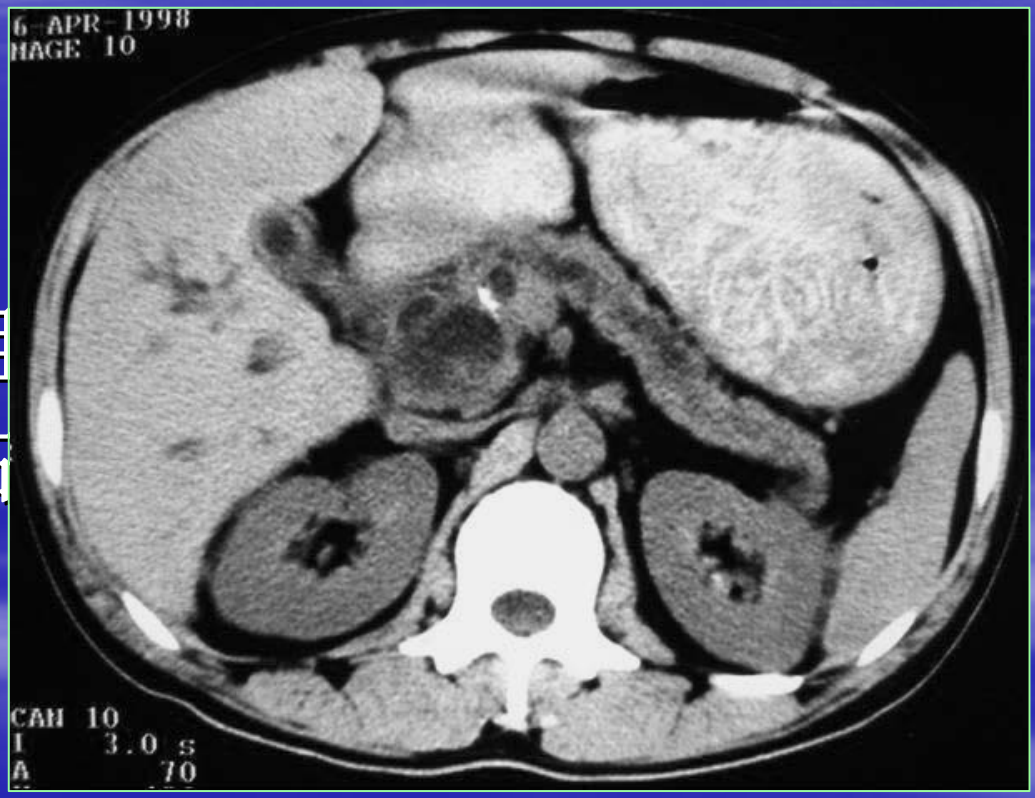


Pseudocysts

Chronic Pancreatitis

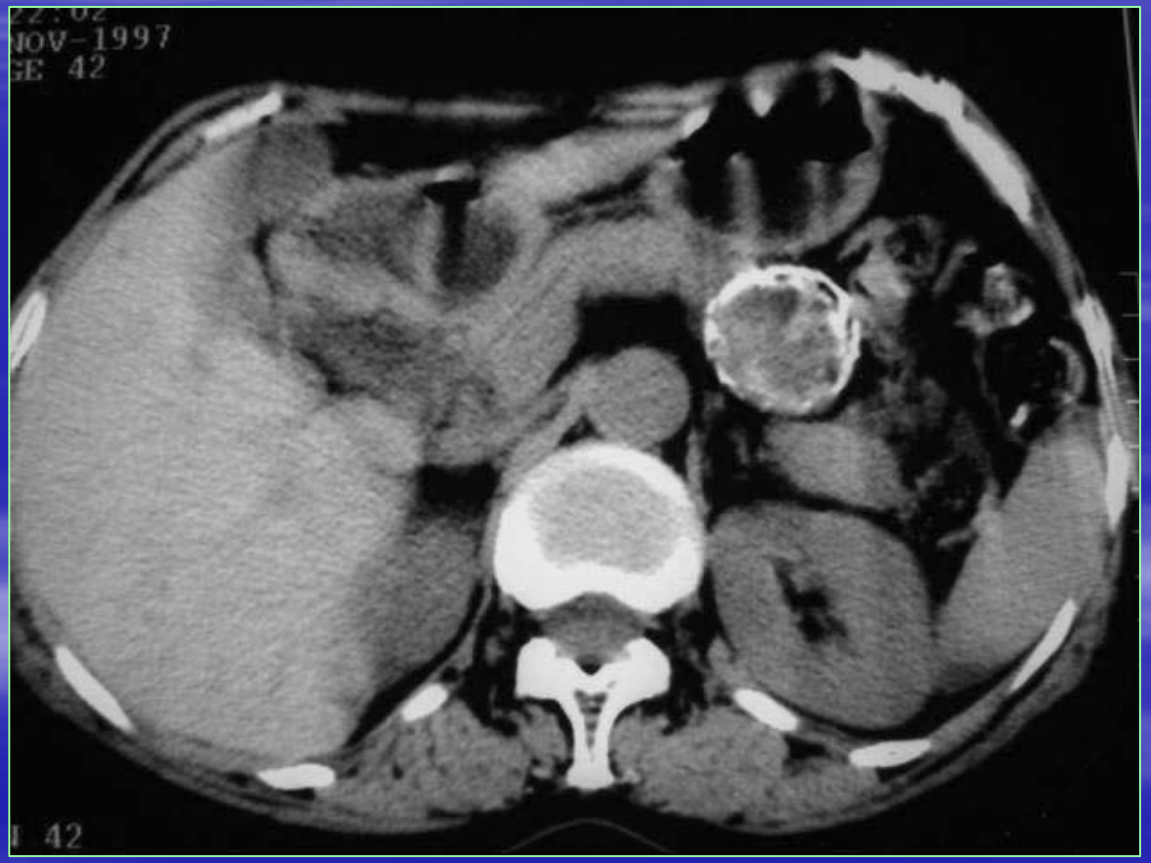
慢性胰腺炎

- 胰管串珠样增粗
- 合并胆总管结石
- 慢性胆囊炎



Chronic Pancreatitis

Calcification



肝胆胰脾---胆管癌

- 临床与病理
  - 上段胆管占50%以上
  - 早期出现胆道梗阻症状
  - 分型：浸润型、结节型、乳头型

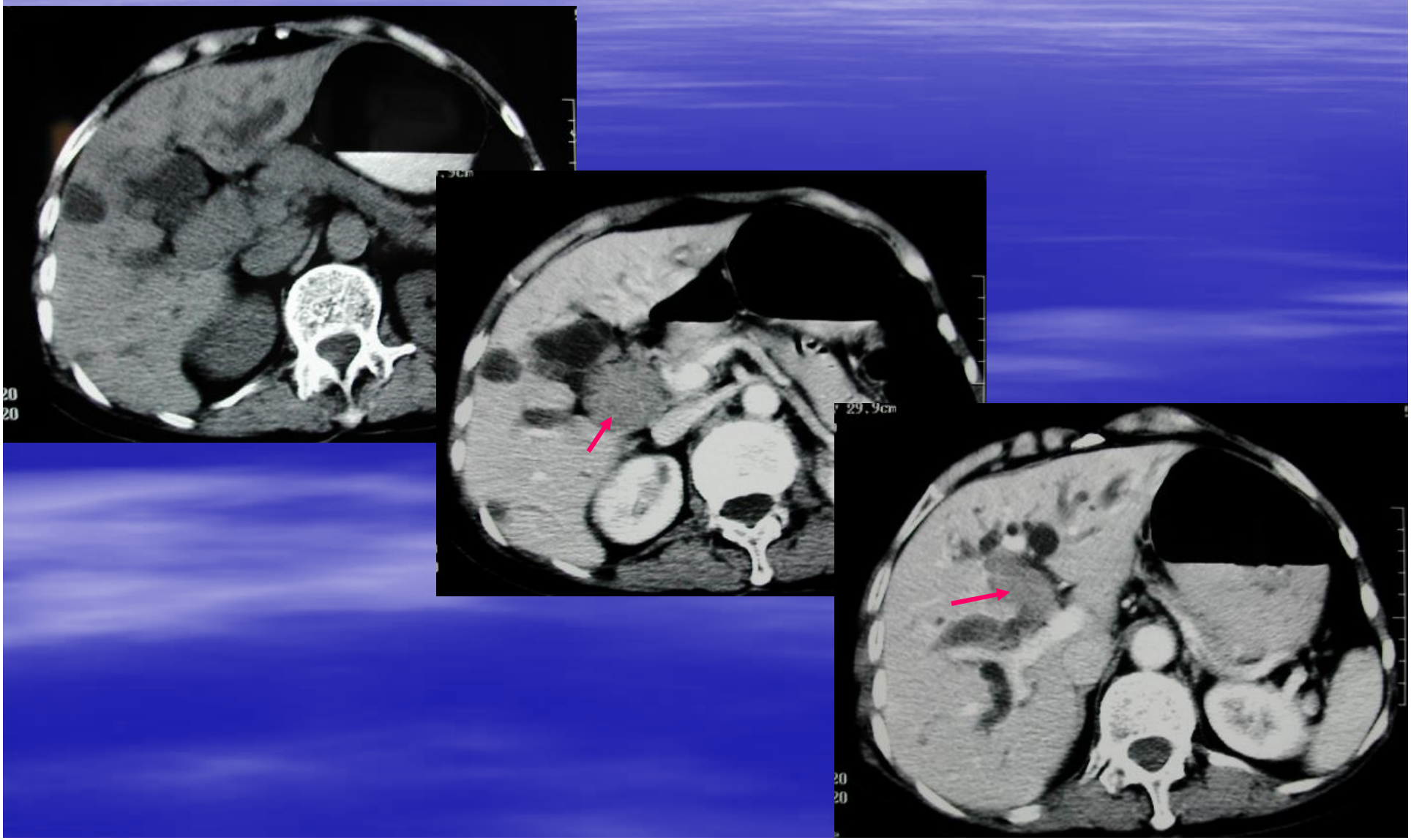
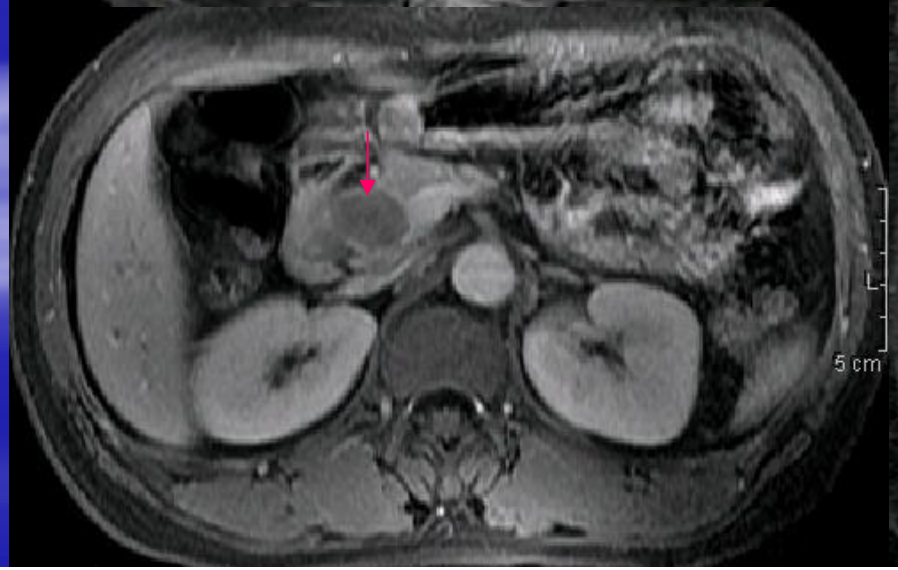
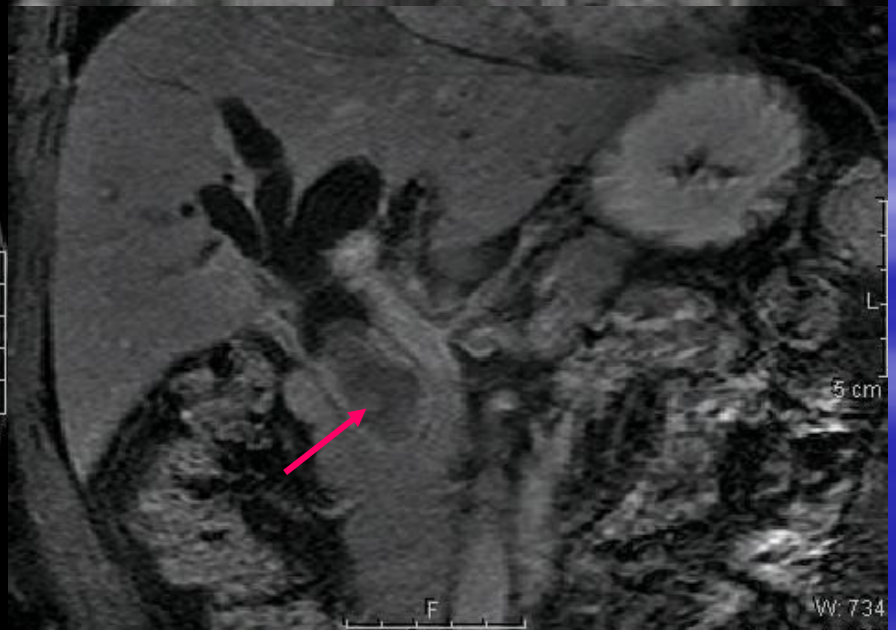
肝胆胰脾---胆管癌

影像学表现：

- PTC或MRCP：胆管局限性狭窄或息肉样充盈缺损，近段胆管扩张，呈“软藤征”。
- CT：近段胆管扩张

  远侧可见低密度肿瘤影（浸润型见不到肿块）
- MRI：近段胆管扩张，远侧可见肿瘤影

肝胆胰脾---胆管癌



肝胆胰脾